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THE BREAKDOWN OF THE MERIDA'S ENGINES.

The following additional particulars concerning the collapse of the engines of the steamer Merida, on May 27, were furnished The Engineer by Mr. James Balfour, chief engineer of the damaged boat, through Mr. James H. Kendall, of Detroit branch, M. E. B. A.:

"I was standing a couple of feet from the stairway leading to main deck, and my son was near the throttle, when we heard a heavy thump like striking a log, or a hatch cover falling into the hold. My first thought was to go on deck, and had partly turned to go, but changed my mind and sung out to my son to shut the throttle, and started for it myself; he was nearest to it and got it almost shut; but it seemed to stick, when I brought my weight on it and am sure it was shut. While doing this I saw the castings opening where the cylinder connects to the frame, or just above it. The h. p. cylinder sank down a foot while I had hold of the throttle. I told my son to get out at once; steam began to fly in all directions, but I don't think it was over two or three seconds from the time of the first intimation of trouble until the engine was falling to pieces. It was a clashing, roaring clang, and down she went. I went through the door to afterhold, but went upon the main deck and, half blind by escaping steam, went aft. I fell 24 feet and found myself in 18 inches of water ballast, under the after hatch. I thought of my son and called him; he replied that he was all right on the second deck just above me. I climbed a steel stanchion to the second deck, got around where the boy was, and we got to the main deck by a ladder aft; a deck hand had pulled one of the hatch covers off to use as a life preserver, but he lost it in the hold; he then took the opposite one off and threw it overboard, but failed to go with it; this left the two end hatch covers off. I fell in the port one, my son in the other. He landed on the hatch covers, for a couple of sections were in place on the second deck. We went forward while steam was blowing so furiously that it nearly blew me overboard trying to get by; the 8¾ inch steampipe was pulled out of the slip joint and there was a space of about 8 feet between the engine-house and boiler-house. I got on top of it and succeeded in shutting off the steam. It was about 10 o'clock p. m. and raining. There are three boilers, 12.5 by 12 feet, and we were running up the lake light, carrying 165 pounds of steam at the time, the engines making 80 revolutions per minute. There is no shoulder on the main shaft, but it is tapered, with a nut to hold the screw in its place; with a 2½ x 6 inch feather sunk in the shaft on the nut end. There had been no signs of looseness of the screw, and it was thoroughly overhauled, at fitting out. The wheel hub was loose at one time, but I had a new feather put on. The l. p. piston rod and connecting rod were bent to a crescent; the connecting rod bolts, 3¼ inches at bottom of thread, cracked in the butt of the rod. One counter-balance on the l. p. crank was slung off into the lower hold, and the h. p. piston rod key, (steel) 1x3½ inches wide, cut clean off on both sides. The h. p. piston rod tapered 1 inch in 12 inches, and was driven over a shoulder of 1½ inch or more, fairly rolling the metal up on the rod. The bearings are all in fine condition, and crank pins as well. There is no sign of abrasion except on the l. p. crank boxes, the babbitt showed a little as though the metal was fairly pulled or wiped under an excessive strain. There was no abrasion on the slides or crossheads. The Merida's wheel was of the sectional type, 14 feet in diameter and 18 feet 6 inches pitch."

The steamship Merida was built by F. W. Wheeler & Co., at West Bay City, Mich., in 1893, for Mr. D. Whitney, Jr., of Detroit, and is considered one of

the finest steel steamers on the lakes. Her engine was a triple-expansion 23, 37, 62 x 42 inches, built by the Frontier Iron Works, Detroit. Geo. Furhman was assistant engineer; his room was within 10 inches of the throttle and steampipe. He was asleep at the time, but was awakened by the crash. The throttle evidently partly broke in the partition right at his side, and about 18 inches above him, nearly in, with Mr. Folkert, his oiler, just above him. The chief engineer had his left knee badly bruised, but no broken bones; his son was badly shaken up, otherwise nobody was hurt. Had the engine room proper been the crank room, as in many of the lake steamers, it is safe to say that there would have been lives lost. It is conjectured that the cause of the accident was the splitting of the screw hub which let the engines race and caused the damage.

MARINE RECORD Life Savers' Series.

CAPT. G. N. GRAY.

Capt. Geo. N. Gray is in charge of one of the most important life saving stations on Lake Ontario. While



CAPT. GEORGE N. GRAY.

the calls to rescue large vessels are not so frequent as in other localities, the crew has to keep a constant lookout for minor accidents, which require prompt response and usually more skill than anyone has an adequate idea of.

Capt. Gray is an instance of rapid and meritorious advancement in the service. He was born in 1860, at Mexico, N. Y., and after he had passed his early youth became a sailor. He remained at this occupation until 1885, when he entered the service at Oswego, N. Y. He remained a surfman until Dec. 13, 1893, when he was promoted to be keeper of Charlotte station.

The Cleveland MARINE RECORD has issued a very neat pamphlet giving the names of lake vessels and their masters, with engineers of steamers, classifying the lists alphabetically for both boats and men. The reference value of the book is great.—Buffalo Enquirer.

NOTES.

The plans of war ships for Japan, to be built in this country, will shortly be completed, and it is fully expected that the Cramp Co., will get the contract to build at least one of these.

The call for bids on the battleships and torpedo boats authorized by Congress will be issued this week, it is said, and every preparation is being made at the Navy Department to hasten matters so that the contracts can be awarded and work begun in a short time.

Secretary Herbert has directed that the work on the monitor Puritan, at the Brooklyn Navy Yard, which was suspended on account of a controversy between Commodore Sperry, in charge of ordnance work, and Constructor Bowles, shall be resumed immediately.

Secretary Herbert has directed that new boilers and engines be put in the cruiser Atlanta at the Brooklyn Navy Yard, in accordance with the provision of the naval bill appropriating \$100,000 for that purpose. The proposition to fit the Atlanta with twin screws will not be carried out, and she will remain a single screw vessel.

The Standard Oil Co's new steel tug Atlas, building by the Harlan & Hollingsworth Co., will be 130 feet long, 25¼ feet beam and 14½ feet deep. Her engines will be of the triple-expansion type, the diameter of the cylinders being 15, 23½ and 39 inches with 30 inches stroke of piston. She will have a steel Scotch boiler with three corrugated furnaces. The dimensions of the boiler will be 13 feet 9 inches by 11.6 feet and will be allowed a pressure of 165 pounds.

Engineer-in-Chief Melville has determined upon some interesting experiments to determine the value of cast steel as shafts for men-of-war. All shafts now in service are made of forged steel, which is very expensive. For instance, a shaft is now on its way to Mare Island for the Mohican which is of forged steel, eleven inches in diameter and weighing 20,000 pounds, for which the department pays about 30 cents per pound. For cast steel the department will pay about 6 cents per pound. It is believed by engineer officers that for small ships cast steel shafts will be of service, but they will not do for the larger men-of-war.

VISIBLE SUPPLY OF GRAIN.

As compiled for THE MARINE RECORD by George F. Stone, Secretary Chicago Board of Trade, June 20, 1896:

CITIES WHERE STORED.	WHEAT. Bushels.	CORN. Bushels.	OATS. Bushels.	RYE. Bushels.	BARLEY Bushels.
Albany		10,000	50,000		
Baltimore	296,000	580,000	304,000	28,000	
Boston	789,000	159,000	73,000		
Buffalo	691,000	185,000	705,000	131,000	237,000
" afloat					
Chicago	13,753,000	5,516,000	1,672,000	299,000	10,000
" afloat					
Cincinnati	5,000	2,000	14,000	1,000	1,000
Detroit	81,000	12,000	9,000		2,000
" afloat					
Duluth and Superior	8,942,000	9,000	254,000	311,000	117,000
" afloat					
Indianapolis	11,000	106,000			
Kansas City	992,000	30,000	26,000	5,000	
Milwaukee	450,000	2,000	81,000	365,000	26,000
" afloat					
Minneapolis	16,730,000	45,000	378,000	85,000	27,000
Montreal	458,000	44,000	321,000	6,000	49,000
New York	2,779,000	615,000	1,815,000	52,000	3,000
" afloat	16,000	33,000	101,000		40,000
Oswego		7,000			60,000
Peoria	13,000	11,000	225,000	2,000	
Philadelphia	264,000	264,000	148,000		
St. Louis	421,000	151,000	51,000	1,000	
" afloat		70,000			
Toledo	244,000	41,000	22,000	81,000	
" afloat					
Toronto	153,000	2,000	87,000		21,000
On Canal	552,000	141,000	568,000	53,000	69,000
On Lakes	1,066,000	1,239,000	1,447,000	96,000	295,000
On Mississippi	113,000	96,000	45,000		
Grand Total	48,819,000	9,370,000	8,396,000	1,521,000	957,000
Corresponding date 1895	46,225,000	9,499,000	7,976,000	137,000	130,000

NEWS AROUND THE LAKES.

CLEVELAND.

THE OTIS ELEVATOR PROPERTY LEASED BY THE CLEVELAND COMMERCIAL CO.—CONTROVERSY OVER RIVER IMPROVEMENTS.

CLEVELAND, June 25.

The Cleveland Commercial Co. which has for some time operated the Big Four dock, has closed a lease of the Otis Elevator, near the foot of River street, and will at once renovate it and prepare it for use. This is a direct outgrowth of the Cleveland Canal Boat Co.'s enterprise. Although the Cleveland Commercial Co. has only lately erected a large freight house at the Big Four dock, with 150 feet front on the river, the transfer business between rail and water has grown to such an extent that the company were obliged to look out for the future and to take care of the present overflow. To this end the Otis property was leased. A spur of the Big Four tracks now runs into this elevator, and it will be used only for warehouse purposes at present; but arrangements are being made to use this as a transfer point for certain grain which comes in from the southwest, and to load it directly on the canal boat here for transportation to New York. This is a trade which it will require some time to get in shape, and arrangements have to be made with the railroads, new tariffs issued, and a great deal of detail work accomplished; but the trade is in sight, although the first use of the elevator may prove to be the transfer of flaxseed and other grains coming from Duluth into cars to be forwarded to Pittsburgh, Philadelphia, and elsewhere. The capacity of the elevator is about 150,000 bushels. The Cleveland Commercial Co. also has arrangements with the Cleveland & Buffalo Transit Co., whereby a good deal of the incoming rail freight is transferred to that line.

Those in charge of the expenditure of municipal funds for marine improvements are showing too much of their old-time disposition to talk instead of going to work. This criticism does not apply to those of the commission who are in the marine business, for they have too vivid a sense of the need for haste to allow of any lapse of time that is not absolutely necessary. But the time has come when a hint to hasten had to be given by the federal government, a hint that means that if the arrangements long ago agreed upon are not carried out by the city, the U. S. government will rebuild the old west pier upon its present site, declining to run any risks of getting into legal controversies over land titles, which are to be guaranteed by the city. A great deal of wind is being wasted over the proposition to put a draw in the Lake Shore tracks at the head of the old river bed, a scheme of very questionable benefit at best, and one which will be resisted by the Lake Shore Railroad Co. till the bitter end, and with good reason, too. In a few days the federal appropriation will be available, and Col. Smith and his superiors are anxious to know, just as soon as possible, how the money is to be expended. It is to be hoped that sufficient pressure will be brought in this way to secure some promptness of action on the part of the city.

The workings of the new coal car dumping plant on the Pennsylvania dock operated by the Cuddy-Mullen coal Co., were inspected by President Roberts of the Pennsylvania, together with James McCrea, of Pittsburgh, Mr. Loree, Chief Engineer Thomas Rodd and others. The Colonial was being loaded at the time. The dredge Hercules, of the Cleveland Dredging Co.'s outfit, is at work improving the channel there, although no trouble has yet been experienced.

The auxiliary steamyacht Liberty Ware is on a cruise to Georgian Bay. On board are Capt. John W. Moore, one of her owners, and Capt. C. G. Ennis, who has been appointed to one of the Rockefeller steamers, and is off for a vacation before she comes out. Claude Ennis and Mrs. Ennis are also on board, with three young ladies, Misses Leick, Winslow, and Greischer. The Ware has a steel boiler house on deck, which gives her much the same appearance as the Walk-in-the-Water. She has a new type of reversible propeller, which is being given a thorough trial.

Capt. Frank Hendrich, of the steamer Waverly, was hurt a couple of weeks ago by the falling of a piece of iron, which struck him a glancing blow on the head after falling forty feet. Capt. Hendrich had a narrow escape, and was so badly hurt that he was somewhat flighty, and at the end of the trip was taken to his home in Detroit. He is all right again now, and writes Mr. J. C. Gilchrist that he able to resume command. The Waverly has in the interim been in charge of the mate.

BUFFALO.

EVERYBODY WAITING TO SEE A RACE BETWEEN CITY OF BUFFALO AND THE NORTH WEST OR NORTH LAND—GETTING AFTER THE VIGILANT.

Special Correspondence to The Marine Record.

BUFFALO, June 23.

Oats and ore appear to be most in evidence in last week's receipts, though lumber jumped up considerably. But oats received by lake amounted to considerably

more than 2,000,000 bushels, and ore exceeded 20,000 tons. There has been good dispatch all round except that some of the ore boats were bunched for the Buffalo furnace, a failing that we shall promptly lay to Cleveland, as the furnace is managed there. The jam is about over and appears to have happened merely because the boats came in faster than was expected.

All talk of the Buffalo "strike" appears to have been dropped. It is hoped that the other ports will learn to depend on the regular correspondents in these matter and not on someone who may happen to be working some private end, as appears to have been the case this time. We are in the service of the whole marine of the lakes in that capacity, and are, or ought to be, known to a great share of the people who are in the marine business, which is quite different from those who are not regularly in the service and who are in no special way accountable for their utterances.

It is hard to say what there is in racing that will stir up a marine man in the way it will. It must be that he takes his share of the natural fighting qualities the race possesses in that way. Ever since the new City of Buffalo came out there has been a constant pricking up of ears all along the docks if anyone mentioned her in connection with the Northern passenger liners. A race was in the air in spite of everything, but it came to nothing. The Buffalo leaves here an hour ahead of the Northern boats and some of the eager people were so sure of a race, even on these conditions, that that they imagined that one came off the first night the two liners came over the route the same night and were ready next morning to say how they came out. But now an actual challenge has been given by Superintendent Brown, of the Northern liners, and eagerly accepted by Capt. Edwards, of the City of Buffalo. It is rather informal, but is at least plain enough. When the side-wheeler wants to try titles she is to wait till the sailing time of the Northern boat, and there will be a race. This appears to give Capt. Edwards the choice of adversaries, and so far as the public knows there is as much speed in one of the Northern liners as the other.

And now someone is holding a chip on the shoulder of the Christopher Columbus and claiming that she can run twenty-one miles an hour, between Milwaukee and Chicago. Though it is claimed that she did once lay out one of the Northern boats, she will need to look to her laurels right away, in spite of her twenty-one miles, for if the two boats for Cleveland get to racing this summer, as is now expected they will, there will be better time made than that.

I would advise the steamer Vigilant, of raft-towing and buoy-moving fame, to watch out a trifle or she will get into trouble. The lake service generally is getting very hot over her exploits, especially when her captain, after carrying off every channel marker he comes up to, is saucy and unapproachable whenever anyone tries to reason with him. I saw someone looking for her owner to-day that looked very much like Secretary Keep, of the Lake Carriers' Association, who said that he had stood the thing about as long as he thought it proper and he was preparing for summary measures.

Some head-line writer takes the dispatch from here, stating that the inside harbor course between Buffalo and lower Black Rock was opened again, to mean that Niagara River has been closed ever since the barge Galatea knocked the bridge into the water at Ferry street. There is a mile of the river as open as it ever was, the inner course being a mere still-water affair for towing barges up stream, and not very much used.

One of the stories of the late E. M. Peck that his friends like to tell, is of his way of making long trips to far-away lands and coming back full of the new things he had seen. He would never enter into the matter of the cost of his journeys. If anyone asked him how much he was out for the jaunt he would say that it was nothing worth talking about. "I am just spending some of the of my heirs. It doesn't belong to me," he would say.

The biggest story that has gone afloat of late is from the canal-boat service. The canal steamer Marion took three loaded grain boats out of here for New York and increased the tow to five on reaching the Hudson. At Tarrytown she dropped them and ran in for supplies. A storm came up and they were soon in great danger of being lost. When the river tug Stevens came along she found them tossing about in Tappan Zee and not a man on board one of them. They had got tired of waiting for the steamer and gone ashore to kill time. The tug brought them all to dock and has now libeled them for salvage. The New York paper which first told the story, says the whole tow and cargoes are worth \$50,000 and there is a good chance of someone standing a quarter of the amount for salvage. Though the steamer is primarily to blame there is evidence of contributory negligence on the part of the captains.

JOHN CHAMBERLIN.

DULUTH AND SUPERIOR.

OPINION SOMEWHAT DIVIDED ON THE PROPOSED NEW MINNESOTA POINT CANAL—BIDS OPENED FOR DREDGING OUT THE DYKE.

DULUTH, June 21.

Special Correspondence to The Marine Record.

Major C. B. Sears has been addressing letters to the commercial bodies of Duluth and Superior with a view to enabling the business interests of the two cities to

get together and agree upon what they want in points where difference exists in regard to the plan of the harbor. The idea of abandoning both the Superior and Duluth entrances, and making a new cut through the central portion of Minnesota Point, is again being brought to the front, but the people of Duluth will hardly consent to it, as it will place Superior in just as good a position as Duluth in the matter of direct access to the open lake.

Major Sears opened bids last Saturday for the improvement of the channels in St. Louis and Superior bays, and for the removal of the old dyke. For the latter work the West Duluth Land Co. bids 40c per lineal foot; C. S. Barker, \$1.65; Williams, Green & Williams, \$1.45. The West Duluth Land Co. bids 19c per cubic yard for dredging in the St. Louis River above Grassy Point, if the dumping is to be done in the lake, and 14c, with privilege of dumping up the river; Williams, Green & Williams bid 18c and 12c under the two conditions; C. S. Barker 21c and 15½c. For St. Louis Bay C. S. Barker bids 14½c, Williams, Green & Williams 12c, and for Superior bay the former bid 11½c, and the latter 13½c.

Mr. Noah W. Gray, who has been manager of the Ashland, Wis., Iron & Steel Co., for several years, has resigned. W. H. Hinkle, of Minneapolis, secretary of the company, will succeed him as manager.

Capt. D. E. Stephens has secured the contract for taking care of the government buoys and ranges in the harbors of Duluth and Superior, with the exception of a few down near Allouez Bay.

The Barnett-Record Co. have completed all the stone and steel bridges on the D. & R. R. between Duluth and Two Harbors, and are now rushing the work on the new ore dock, which will be ready for work about July 1.

Wheat in store here is apportioned among the various terminal elevator lines as follows: Belt Line, 963,943 bu; Consolidated, 2,047,668; Globe, 3,266,686; Great Northern, 921,048; Superior Terminal, 1,582,943; Consolidated B, 114,819; Consolidated H, 44,783. Aggregate, 8,941,890. There is 16,730,094 bushels of wheat in store at Minneapolis.

DETROIT.

THE CITY BOASTS THE FINEST HARBOR MASTER'S OFFICE ON THE GREAT LAKES—GOOD BUSINESS OF THE PASSENGER LINES.

Special Correspondence to The Marine Record.

DETROIT, June 24.

Detroit has now one of the finest harbor master's offices on the Great Lakes. For some time the accommodation had been unsatisfactory, and several plans were proposed, until finally it was decided to utilize a small part of the open front facing the river in front of the municipal electric lighting plant. The building is built of selected brick, with smooth mortar used, and has boat and office entrances from the river-side. It is two stories high, the lower floor being composed of concrete, and the upper floor of hardwood, finished, as is the wainscoting, in oil. Everything about the building will be first-class, and the most pleasant spot on the entire city river front has been selected. The rear and right side of the building is flanked with a large lawn, back of which is the lighting plant. A derrick is to be used in raising and lowering the harbor master's boat, and the building will be lighted with electricity. The site is owned by the city, and it is calculated that four years' rent, at the old office rate, will pay for the new building. The entire place is practically fire-proof, and is one the city may well be proud of.

General Passenger Agent Schaantz has again come to the front with an advertising card unique of its kind. It represents the four principal boats of their line actively engaged in making good their runs on a baseball diamond while less successful competitors are frantically endeavoring to "put them out." On Monday night the City of Alpena went up with every stateroom full, and the City of Cleveland took 300 Mystic Shriners to Cleveland to attend the Imperial Council of the A. A. O. N. M. S. at Cleveland on Tuesday.

The passenger steamer Cambria, of the Windsor and Soo Line, running from Sandusky to the Sault, ran on a rock in a fog on Georgian Bay last Friday. The affair was kept very quiet, and two or three days passed before the news was known. On Tuesday the vessel was released by the steamer Majestic. The Cambria is very staunch, and it is understood is little the worse for her rub with the rocks.

It has just been learned that the accident to the Mineral Rock off Lorain on Sunday last was due to her attempting to carry her canvas through the squall in order to beat the schooner Reuben Doud, with which she was racing.

The annual meeting of the New London Steamboat Co. was held at New London, Ct., on the 10th inst. Alexander McVittie, Frank E. Kirby and Gilbert N. McMillan, of Detroit, are the principal stockholders in the line. Mr. McVittie was elected president of the company; J. N. Harris, of New London, vice-president, and Robert Coit, of New London, treasurer. The company operates two package freight steamers between New London and New York in connection with the Grand Trunk and Central Vermont Railways, and a side-wheel passenger steamer between New London, Mystic Island, Watch Hill and Block Island.

CHICAGO.

TRIAL OF SPEED BETWEEN THE CHRISTOPHER COLUMBUS AND THE VIRGINIA—MISHAP OF THE CITY OF CHICAGO.

Special Correspondence to The Marine Record.

OFFICE OF THE MARINE RECORD,)
CHICAGO, June 24. }

Captain Robert E. Lundey is requested to communicate with Deputy Collector of Customs Nash, at the Chicago barge office, who has some business of importance to inform him about.

Captain Frank Dalton has been appointed master of the schooner D. L. Filer.

Grain freights are dull and may be quoted at 1½¢ on corn to Buffalo.

The steamer City of Chicago, of the Graham & Morton Line, which left Chicago with about 500 excursionists for

well bolted through from bottom, and clinched. The clamps and shelf are 2 by 6 inches, and all bolted with screw bolts. All the timber is white oak of the very best quality.

The cabins are of the trunk style, finished with Pennsylvania cherry, with two cabins, one cook-room, one wash-room, one Bishop's water closet. The cabin seats are made to draw out, so as to be used for beds on a cruise. The windows are all of plate glass; all door trimmings are brass. The upholstery and carpets and window curtains are made in the best manner and of the best material.

The engine is a fore-and aft compound, with cylinders 7 and 14 inches by 10 inches stroke, fitted with Marshall's reversing gear; the cylinders are close together, making the engine only 32 inches long. The working parts are of forged steel, including the crank and shaft. The propeller is phosphor bronze.

The boiler is water-tube, originated with the builders. The steam coils are made of 1¼-inch pipe, extra heavy, taking water from a 4-inch double-thick manifold pipe running all around the bottom, from thence leading to a steam pump 20 inches in diameter and 6 feet long. The bends are made with plugs screwed in opposite each pipe, so any pipe can be looked through at any time in any part of the boiler. This is an improvement of great value in a pipe boiler, and overcomes a fault made much of by some of the builders, who claim the great advantage of looking through any tube. The boiler is constructed under the supervision of the government inspector, which is sufficient guarantee of good work-manship. It will weigh 6,800 lbs., holds three barrels of water in steaming order, and is tested to 400 lbs. cold water pressure. It will be allowed 175 lbs. steam working pressure, and occupies a space 4 feet 9 inches wide by 6 feet long and 5 feet 2 inches high. It will be fed by a Worthington duplex feed pump and one injector, with all necessary mountings of a superior quality.

This type of boiler is now used by the firm in their 33-foot boats, which are in popular use. This machinery will exert 180 horse-power, and drive the Miltonia 14 miles an hour.

A picture of the Miltonia was printed in THE RECORD last winter.

WRECKS AND WRECKING.

H. W. Baker, of Detroit, went last week to the wreck of the J. M. Allmendinger, fifteen miles north of Milwaukee. He was accompanied by Diver Charles Peak, who found the hull opened up somewhat by sand and pebbles, which had ground in through the seams. They then went to the schooner Col. Ellsworth, which was driven on the beach off Whitefish Point last year. The hull of the Ellsworth is being made as nearly water-tight as possible, when a channel will be dredged to her and an attempt made to pull her off.

The wrecking steamer Johnson has resumed her search for the lost steamer John Shaw, which went down in Lake Huron in November, 1894. The Sachem ran into the spars of a sunken vessel above Thunder Bay, opposite Greenbush, and it thought to be the Shaw.

The schooner Helvetia came into collision with the steamer Australasia, Monday night, in the Canadian caannel of the St. Mary's river. The Helvetia was bound up light and the steamer was coming down. The Helvetia's jibboom carried away half the steamer's bridge, and stove in the steamer's bulwarks for a length of twelve feet.

The steamer Cambria, of the Windsor-Sault line, went ashore near Algoma mills, Georgian Bay, in a fog, Friday afternoon, the 19th. She was very slightly damaged, the chief injury being the delay, which, as she is a passenger boat, is rather annoying to the management.

The schooner Olive Jeannette had her cabins ruined by fire, which broke out as she was off Stannard Rock, Lake Superior.

The schooner Mineral State lost her fore and mainsails and flying jib, worth about \$500, in last Sunday's gale on Lake Erie.

Samuel Harrold has been appointed assistant light keeper at St. Joseph, Mich., vice W. G. Nichols.

NOTICE TO MARINERS.

The June bulletin of the Hydrographic Office calls attention to a dangerous shoal reported through the Cleveland branch office by Capt. James Owens, of the steamer G. W. Morley, which struck there some weeks ago. The instructions are as follows:

"Mariners are cautioned to avoid the shoal marked on U. S. Engineers' chart No. 53, of the St. Lawrence River, 1½ (1½) miles S. by W. ¾ W. (S. 19° 41' W.) from Burnt Island light, as information has been received that there are boulders with but twelve feet of water over them on this shoal. Burnt Island light N. by E. ¾ E. (N. 19° 41' E.) distant 1½ (1½) miles. Center of Hickory Island SE. ½ S. (S. 39° 22' E.)."

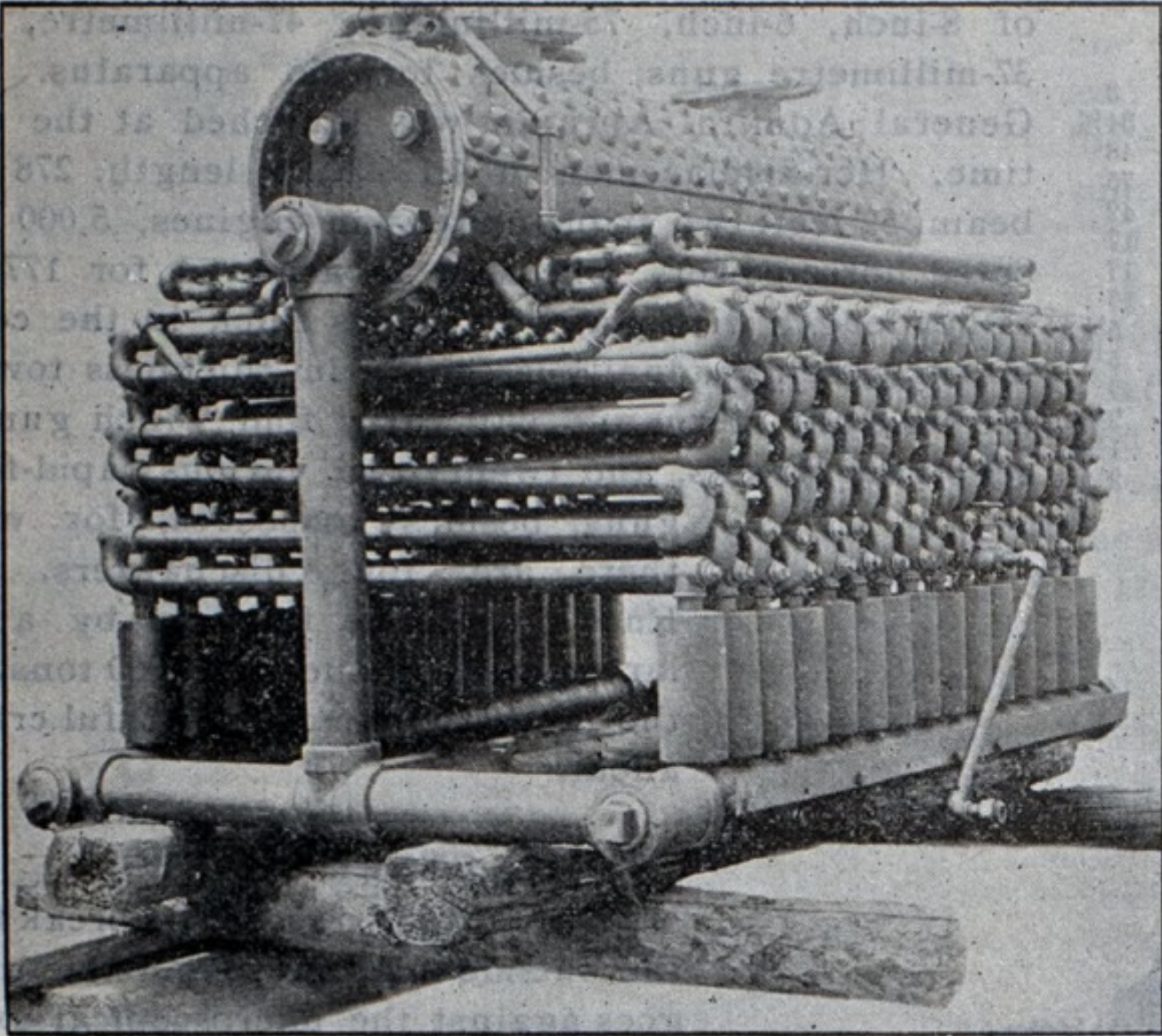
The 25-foot red spar buoy marking Nice Shoal, on the west bank of the channel between Grand Island and Tonawanda Island, Niagara River, has been discontinued.

A shoal with but sixteen feet of water over it and mud bottom has been reported 1,200 feet from the northwest end of the outer breakwater at Chicago. This was reported to the branch office at Chicago by Capt. P. C. Roach.

A report has been received from Capt. H. M. Boyce, of the steamer Omaha, stating that the Omaha struck on a shoal about 1½ miles eastward of Devil's Island, of the Apostle Group, in Lake Superior. She was drawing fourteen feet of water, and at the time she struck Devil's Island light bore W. by N. (N. 78° 45' W.) distant about 1½ (1½) miles. Mariners are cautioned to look out for this shoal, as it is not marked on the charts, although the charts indicate a shoaling of water between Devil's Island and North Twin Island.

Information has been received from Capt. F. Henrich master of the steamer Waverly, stating that fourteen feet of water may be carried through the cut from Torch Bay to Torch Lake. The cut is marked by three lights on cribs on the west side, and by a row of stakes on both sides. Vessels bound from Torch Bay to Lake Linden follow the center of the bay, taking care to leave red stakes to port and black stakes to starboard. When the nearest two cribs are in range steer for them, until the stakes can be seen, then follow the staked channel through the cut. In coming from Torch Lake to Torch Bay a red barn on the south side of Torch Bay is a good mark for running through the cut.

The Lighthouse Board's bulletin for June calls attention to the fact that a black second-class nun buoy was established May 1, in 17½ feet of water at the entrance to the new cut at Green Bay. Grassy Island lights in range, S. 23° 56' W. (SSW. ½ W.) 8,000 feet, (1½ miles); Tail Point Light N. 5° 30' W. (N. ½ W.) 6,400 feet (1½ miles). Three black spar buoys were also placed on the



BOILER OF THE STEAM YACHT MILTONIA.

Designed and built by Davis & Son.

Saint Joseph Sunday morning at 10 o'clock went on the beach off Saint Joseph about 2 o'clock in the afternoon in a dense fog. Capt. McIntosh had been running the steamer at reduced speed because of the fog and was feeling his way toward St. Joseph harbor when she ran on. The Graham & Morton Co.'s new tug Andy went to the steamer's assistance and released her, and the City of Chicago arrived in Chicago at 10:30 o'clock Sunday night with her party of excursionists, none the worse for her mishap.

Captain Edward H. Dykes, whose last command on the lakes was the schooner Evaline Bates, was in Chicago Tuesday and is looking hale and hearty. He attained the age of seventy-one years on June 16, and is at present more hardy, supple and fit for duty than men twenty years his junior and he hopes soon to be in active service again with his little schooner Mary E. Dykes of Grand Haven.

The whaleback excursion steamer Christopher Columbus took along a goodly number of the members of the press on her first trip this season to Milwaukee, on Friday last, who witnessed her trial of speed with the Goodrich Transit Co.'s fine steamer Virginia. The Columbus got out of Chicago harbor about twenty minutes behind the Virginia, overhauled her when about twelve miles from Milwaukee and arrived there a few minutes ahead.

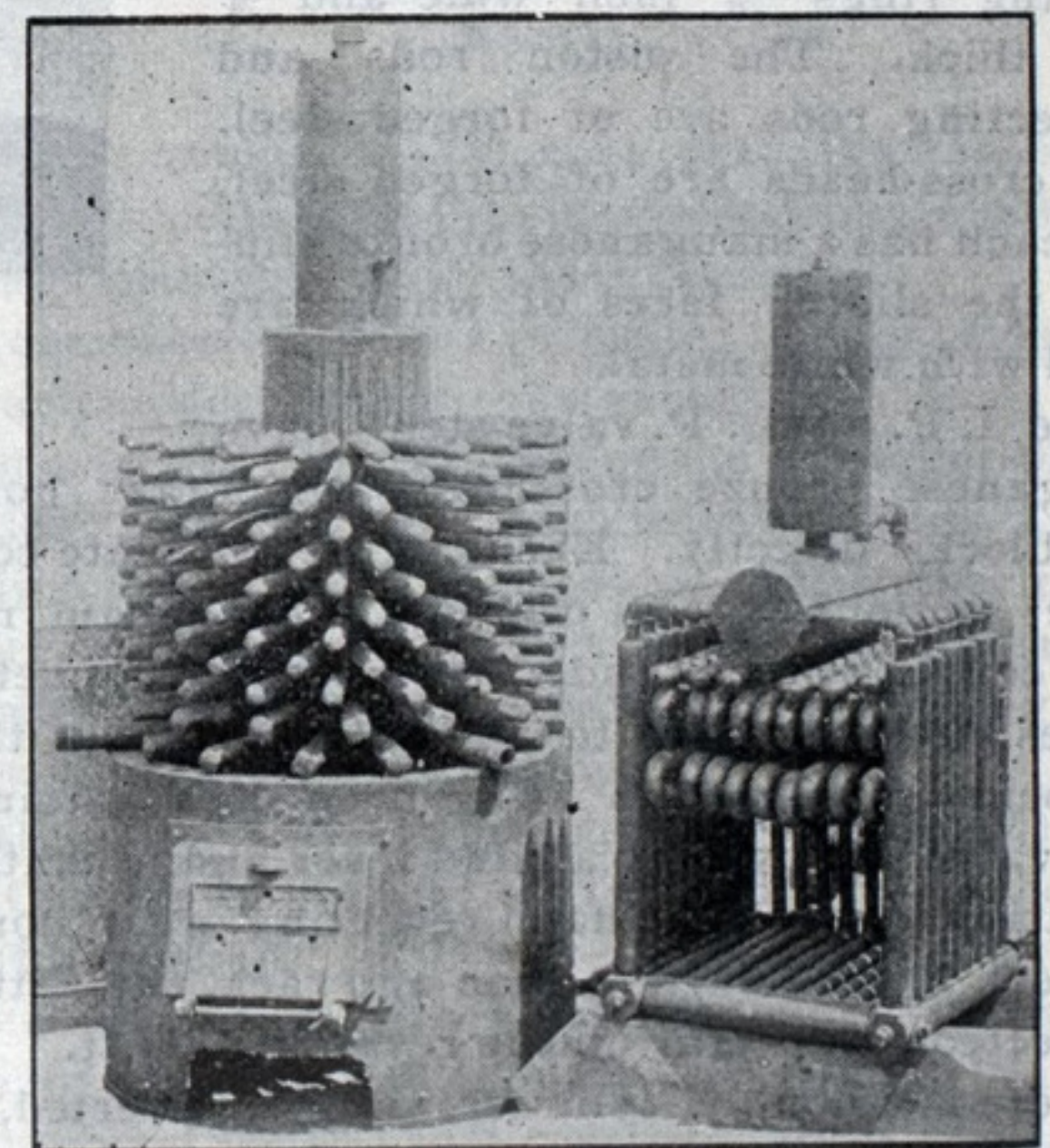
THOMAS WILLIAMS.

BOILERS OF STEAM YACHT MILTONIA.

Some months ago THE RECORD printed an illustration of the steamyacht Miltonia, building by Davis & Sons, of Kingston, Ont., for A. E. Knoff, of No. 36 Spruce street, New York. The Canadian Engineer states that she will be ready this month.

Readers of THE RECORD will be interested in the accompanying illustration of the Miltonia's water-tube boiler, the ideas of which originated with the builders. The "Porcupine," another of their boilers, is also shown. The description of the boiler is given below.

The drawings of the boat, engine and boiler are from the pen of R. Davis, senior member of the firm. She was designed by M. R. Davis, who superintended the construction of hull and cabins, and also the engine patterns. The engine and boiler were built under the superintendence of John H. Davis, the junior member of the firm. The hull is 70 feet long over all, 60 feet load water line, 12 feet 3 inches beam, 5 feet 9 inches in depth of hold and 3 feet 10 inches draft, inwith a displacement of 28 tons. Her frames are double, spaced at 18 inches centres; moulded 4 inches at keel and 3 inches at top; 1½ inch flitch double, and bolted together with 800 bolts with nuts. The keel and keelson are both 6 by 8 inches,



PORCUPINE BOILER.

Built by Davis & Son.

same date at equal intervals on the east side of the new channel, between the first-mentioned buoy and the point where dredging for the straight channel commences, nearly oppsite Outer Buoy (new cut) No. 4. Mariners are warned that the dredging in this new channel is not yet completed.

Major C. B. Sears, U. S. engineer in charge, has completed his inspection of Portage Lake and ship canals across Keweenaw Point. He states that all the old dredging contracts have been completed, and that there is now fully fifteen feet of water clear through.

ENGINES OF BATTLESHIP MASSACHUSETTS.

By an act approved June 30, 1890, Congress authorized the building of three heavily armored and formidably armed battleships of the first class, primarily intended for coast defense, but of sufficient seaworthiness for extended cruises in case of offensive operations. They have been named the *Indiana*, *Massachusetts* and *Oregon*. The *Indiana* has heretofore been described in these columns. The *Massachusetts* is now practically in service, and was built by the William Cramp Ship and Engine Building Co., of Philadelphia. The contract was signed Nov. 18, 1890, the price for hull and machinery, exclusive of armor and armament, being \$3,063,000.

In the *Massachusetts* there are two vertical inverted, direct-acting, triple-expansion main engines placed abreast of each other in separate water-tight compartments, the high-pressure cylinders being forward.

Each cylinder is supported by an inverted cast-steel Y frame on one side, and by two hollow forged steel cylindrical columns on the other. The intermediate and low-pressure cylinders are steam jacketed on the sides and bottom, but the high-pressure are not, but are fitted with working liners. There are no starting valves on the cylinders, provision being made for starting the engines by admitting live steam to the receivers. The relief valves for the cylinders are placed on the valve chest casings, on connections between the steam and exhaust sides of the main valves. There are two receivers for each engine, consisting of exhaust pipes and valve chests, the safety valves of which are set at 100 pounds for the I. P. and 60 pounds for the L. P. The main valves are of the single-ported piston type, there being one for the H. P., two for the I. P. and four for the L. P. cylinder. They are provided with balance pistons, the cylinders of which form part of the upper covers of the valve chests. The valve gear is of the Stephenson type with double bar links. There are no independent cut-off valves, but provision is made to cut off in each cylinder, varying from .5 to .7 of the stroke, by means of a block to which the suspension links are attached, which block can be moved by hand screw gear in a slot in the end of the arm on the reversing shaft.

The main pistons are steel castings, dished, and are each fitted with two packing rings $\frac{5}{8}$ inch wide and $\frac{3}{4}$ inch thick. The piston rods and connecting rods are of forged steel. The cross-heads are of forged steel, and each has a manganese bronze slipper, the sliding faces of which are fitted with white metal.

The I. P. and L. P. valve stems have manganese bronze crossheads which take hold of the link blocks directly. Each engine bed plate consists of three sections of steel castings. The steam reversing gear consists of a cylinder 14 inches in diameter by 20 inches stroke, secured to an engine Y frame, the piston rod being connected to an arm on the reversing shaft. The valve is moved by a hand lever and is controlled by a floating lever. The hand reversing gear consists of a wheel, worm shaft, pinion and rack, the latter being connected to an arm on the reversing shaft.

There is a double cylinder, simple, inverted, turning engine with cylinders 7 inches in diameter and 7 inches stroke secured to the high pressure Y frame. It drives a worm wheel on the forward end of the high pressure crank shaft by means of worm gearing and a second worm; the latter is made to slide on a feather key, and is held in place by a collar below and a removable key above it. A ratchet is fitted to the shaft of the engine for turning by hand.

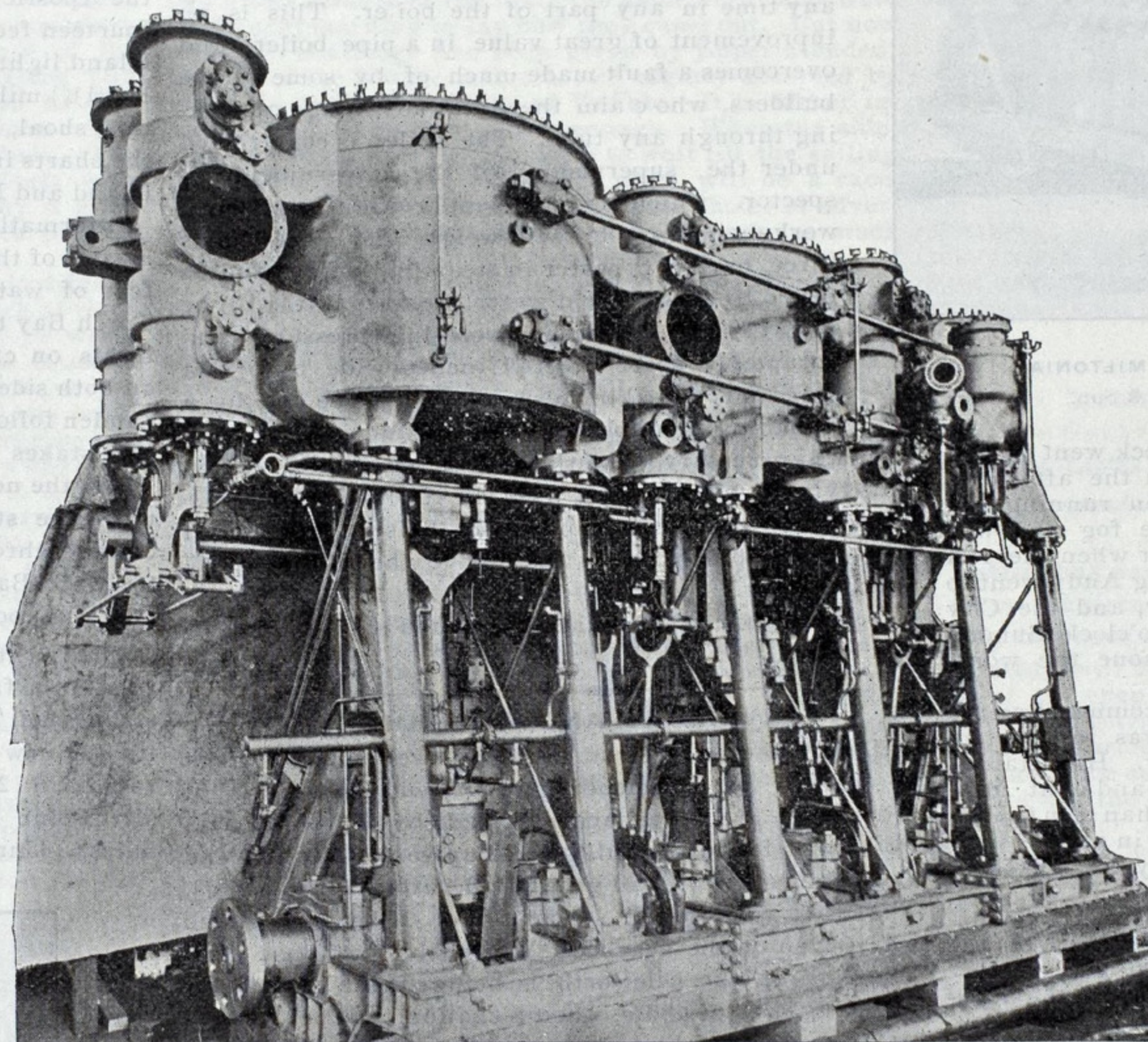
Each main engine is fitted with a disc stop valve $13\frac{1}{4}$ inches in diameter, having a screw stem and a balance piston, and a butterfly throttle $15\frac{1}{2}$ inches in diameter. The main steam pipes are of copper and strengthened with steel bands 6 inches apart.

In the port engine room there is a distributing oil tank

supplied from the main oil tanks by a Blake duplex pump, steam cylinders 2 inches in diameter, oil cylinders $1\frac{1}{4}$ inches in diameter, stroke, $2\frac{3}{4}$ inches. Distributing pipes lead to the various manifolds which are fitted with adjusting valves, and from the manifolds, tubes lead to the various parts to be lubricated.

The crank, line, and propeller shafting is hollow and of forged steel. The crank shaft of each engine is in three interchangeable sections, the cranks placed at angles of 120° . There are two sections of line shafting to each engine, supported on three bearings. The propeller shafts are fitted with a composition casing from inboard the stern tube stuffing box to the propellers; they extend far enough inboard to allow the inboard stern bearings to be withdrawn without moving the shafts. The dimensions of cylinders and valves are shown as follows:

Cylinders, number for each engine.....	3
Cylinders, diameter of H. P., inches.....	$34\frac{1}{2}$
Cylinders, diameter of I. P., inches.....	48
Cylinders, diameter of L. P., inches.....	75
Stroke of pistons, inches.....	42
Valves, diameter of H. P. (one for each cylinder) inches.....	17
Valves, diameter of I. P. (two for each cylinder) inches.....	17
Valves, diameter of L. P. (four for each cylinder) inches.....	17
Balance pistons, diameter of H. P., inches.....	$5\frac{1}{4}$
Balance pistons, diameter of I. P., inches.....	$6\frac{1}{4}$
Balance pistons, diameter of L. P., inches.....	7
Valve stems, H. P. [1] diameter, inches.....	$2\frac{3}{8}$
Valve stems, H. P. [1] diameter through valve, inches.....	$1\frac{3}{4}$
Valve stems, I. P. [2] diameter, inches.....	$2\frac{3}{8}$



ENGINES OF THE BATTLESHIP MASSACHUSETTS.

Valve stems, I. P. [2] diameter through valve, inches.....	$1\frac{3}{4}$
Valve stems, L. P. [4] diameter, inches.....	$2\frac{3}{8}$
Valve stems, L. P. [4] diameter through valve, inches.....	$1\frac{3}{4}$

For the above description and illustration we are indebted to the Journal of the American Society of Naval Engineers.

FOR SALE AT THE RECORD OFFICE.

Beeson's Marine Directory is invaluable to marine men.—Buffalo Express.

The latest volume of Beeson's Marine Directory, just out, is larger than any of its predecessors, is handsomely illustrated and contains a larger mass of data than ever heretofore.—Cleveland Leader.

Beeson's Book is the standard work on lake shipping and this year's number totally eclipses all former issues. The illustrations are fine.—Duluth Evening Herald.

We note that the Directory is double its former size and that it is an improvement all around over former issues.—O. S. Richardson Fueling Co.

THE MARINE RECORD has just issued a nice little book containing a full and correct list of the boats, masters and engineers, where the latter are used. Its price is only 25 cents and everybody connected with the marine business should have one.—Ashtabula Beacon.

A NEW RUSSIAN WAR SHIP.

The largest vessel ever launched on the Neva took the water May 12 in the presence of the Czar. It was the new warship *Russia*. She is 464 feet between perpendiculars, with a displacement of 12,195 tons. Including the ram, the full length of the *Russia* is over 480 feet, and the greatest breadth over all is 68 feet. The *Russia*'s coal-carrying capacity is 2,500 tons. Her triple-expansion engines, made at the Baltic Works, are of 17,000 indicated horse power, and her expected speed is 19 knots. The boilers, thirty-two in number, are of the Belleville type, made in France. The armor plates of the belt are made at the Carnegie mills in America. The cruiser has a double bottom and 149 watertight compartments, and carries fourteen different boats, including steam launches. Her armament will consist of 8-inch, 6-inch, 75-millimetre, 47-millimetre, and 37-millimetre guns, besides torpedo apparatus. The General Admiral Apraxin was launched at the same time. Her displacement is 4,126 tons; length, 278 feet; beam, 52 feet; two triple-expansion engines, 5,000 indicated horse-power. She will be armored for 177 feet of her length with plates 10 inches thick in the center of the vessel, gradually lessening in thickness towards the stem and stern, and will carry four 9-inch guns in revolving turrets, and twenty-two various rapid-firing guns, besides torpedoes, for which there are four dischargers. The *Russia* is to be followed by a still larger cruiser, one of 14,000 tons, and the largest and most powerful cruiser afloat.

STEEL SHAFTS.

The fact that steel shafts break from the outside instead of from the inside goes against the microscopical examination of minute bits of the interior of shafts, says Engineering Mechanics. One steamship engineer who had put in 110 steel shafts in 14 years, one of which had run 1,000,000 miles and was still good, did not take any interest in the microscope. The naval engineers in England who have been going over the whole question think breakage is generally due to fatigue, a correct view, because steel has nerves just as much as human beings. Some engineers still favor the boring out of shafts in order to take away that part containing defects in casting; but this is not a general rule, because often the best part of the steel is towards the center of the shaft and not on the outside. In cooling off a steel casting the sulphur and carbon collected in the center because that part remained fluid longest. Forgings need annealing just as castings do, but if a steel casting were put in an annealing furnace it would be ruined.

One eminent engineer declares the proper way to make a steel shaft is with the hydraulic press. The custom of one well known maker of shafts is to anneal a straight forging, turn it in the lathe and then anneal it again. They produce the collars at the end by upsetting the metal so as to get the fibers running round into the flange from the shaft. Just what fatigue of metal means in a chemical or mechanical sense is hard to define, as every worker in metal knows. Still that is the only word we have to describe a result and condition.

Bids were opened at Detroit Thursday at the office of Col. Lydecker for widening portions of Hay Lake channel and were awarded as follows: Section E. channel, below Little Rapids, Dunbar & Sullivan, $9\frac{1}{8}$ cents per yard; section F. channel, at angle foot of Hay Lake, Hickler Bros., $21\frac{1}{2}$ cents per yard; section G. channel, from dyke to angle at Little Mud Lake, Hingston & Woods.

Narcissa (on a cruise)—"What is the matter Capt. Bobstay?" Captain—"The fact is my dear young lady, we've smashed our rudder." Narcissa—"Never mind. It's mostly under water and nobody will notice it."—Household Words.

ANOTHER TYPE OF TOWING MACHINE.

Mr. Frank S. Manton, manager and sales agent of the American Ship Windlass Co., which manufactures and owns all rights connected with the Shaw & Spiegel steam towing machine, now so extensively and exclusively used on the Great Lakes, has just been awarded a patent (No. 562,316) on another type of towing machine. Application for this patent was filed December 9, 1895, the claim being as follows:

1. The combination of a ship's windlass for handling the anchor chains, with a towing-machine having its engines geared to said windlass-shaft, and a pressure-regulator for controlling the steam-pressure in the

of which are controlled by a pressure-regulating valve operatively connected with the towing-drum shaft, a ship's windlass arranged close to and substantially parallel with the drum-shaft of said towing-machine, and gearing and locking devices between the windlass-shaft and the drum-shaft for connecting and disconnecting the engine-shaft and said windlass-shaft.

9. The combination with a towing-machine having a loose drum, and an engine-shaft, of driving-gears on said towing-drum shaft, provided with means for locking them together or for locking one gear to the towing-drum, and a windlass geared to one of said driving-gears.

10. The combination with a towing-machine having a loose drum, a windlass, and an engine-shaft, of driving-gears loosely mounted on the towing drum-shaft, one of which gears is connected with the engine-shaft and the other with the windlass-shaft, and means for locking the driving-gears together or for locking one of said gears to the towing-drum.

11. The combination with a towing-drum shaft carrying a loose drum, a windlass, and an engine-shaft, of driving gears *b, g*, loosely mounted on said towing-drum shaft and meshing, respectively, with the engine-shaft and the windlass-shaft, and a locking-key reversibly fitted in said gear *g* to engage with the gear *b* or with the towing-drum.

12. The combination of a towing-machine, the engines of which are controlled by a pressure-regulating valve operatively connected with the towing-drum shaft, a ship's windlass arranged alongside of and substantially parallel to the towing-drum shaft, a capstan having gearing and locking devices for connecting the capstan-shaft to the windlass-shaft, and gearing and locking devices for connecting and disconnecting the windlass-shaft through the towing-drum shaft with the engines of said towing machine.

The American Ship Windlass Co. is in receipt of the following letter:

AMERICAN TRANSPORTATION Co., 317 Fourth Ave., }
PITTSBURGH, PA., June 19, 1896.

Frank S. Manton, Esq., Agent American Ship Windlass Co., Providence, R. I.:

Dear Sir:—On my return home I find your valued favor of the 1st inst. In reply thereto beg to advise that the working of your Steam Towing Machine on the schooner Tyrone has so far been most satisfactory, and fully carries out all that you have claimed for it. Very truly yours,

G. E. TENER, President.

FOUR-MASTED SCHOONER HONOLULU.

This novel vessel has just been built by Messrs. R. Duncan & Co., Port Glasgow, to the order of Mr. John End, of Honolulu, for the lumber traffic. She is 225 ft. long over all; 210 ft. between perpendiculars; 42 ft. beam; and 18 ft. 6 in. depth of hold. She has sufficient internal capacity to stow one and a quarter millions of



superficial feet of timber. There is no obstruction whatever in her hold from stem to stern, excepting her collision bulkhead. The illustration here given shows the Honolulu with all plain sail set. The masts, four in number, are of uniform length, and are made of steel; they are 140 ft. long from heel to truck. It is asserted that for an equal displacement she can spread more canvas than any square-rigged vessel afloat. Her sails are hoisted, anchors weighed, timber stowed and discharged and all warping done by steam. Comparatively few hands are required to manage her.

CHANCE FOR EXCURSION BOATS.

The Toledo International Yacht Race Association is prepared to contract with steamboat owners for the carrying of passengers to the lake from Toledo, during the series of races which will be held for three or four days, beginning August 24. Address W. H. Porter, secretary, Chamber of Commerce, Toledo, O.

The town council of Manitowoc, has decided to dredge the river around the peninsula to the new Wisconsin Central coal docks to twenty feet, at a cost of \$25,000.

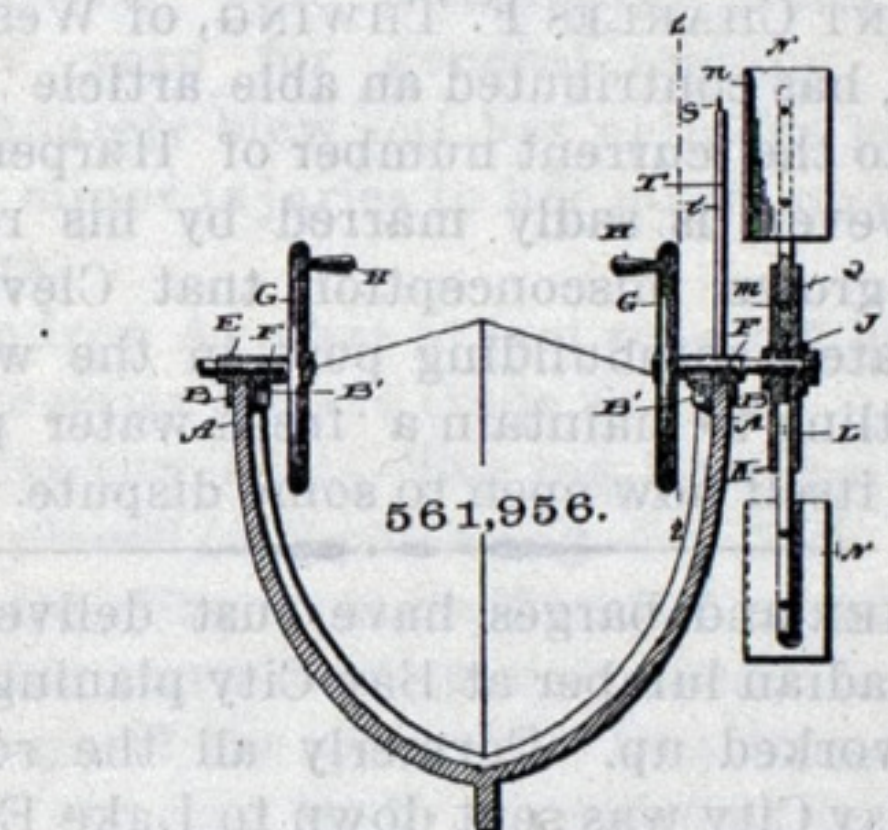
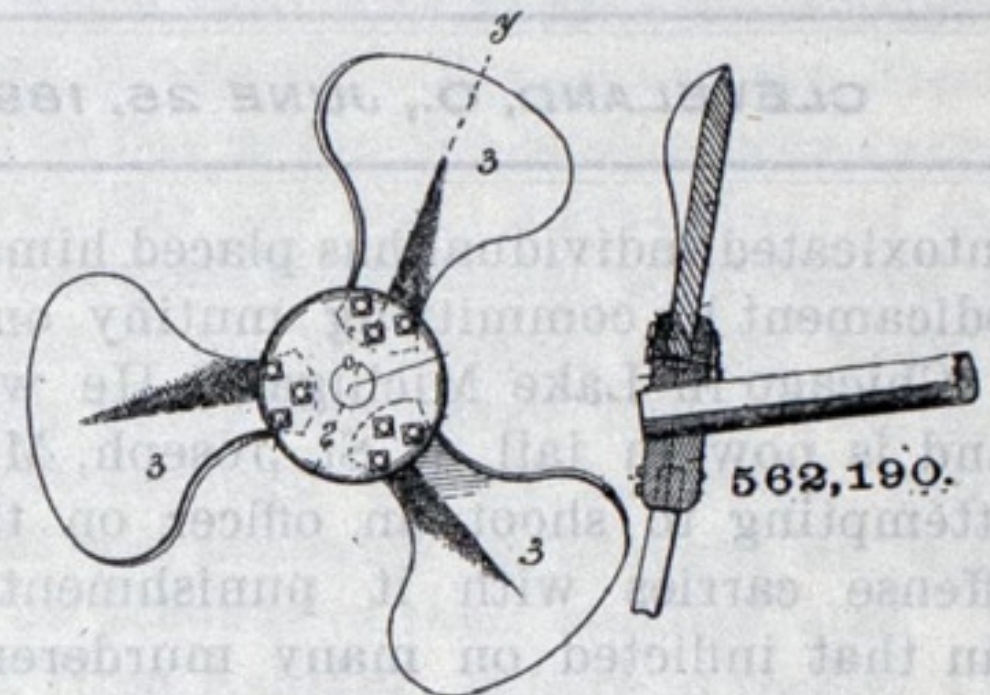
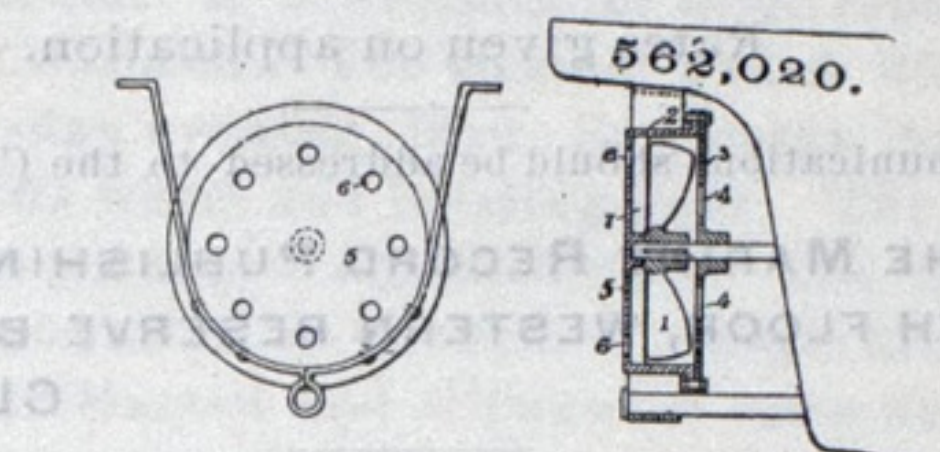
NEW PROPELLER WHEELS.

Troubles never come singly. During the past week two more inventors have been granted letters patent on inventions of as many new types of propeller wheels, and another genius is getting ready to put a new boat propeller on the market.

Patent No. 562,190, which was awarded to John R. Miller, of Thompsonville, Ga., protects a screw propeller on which the claim is for the combination, with a propeller-shaft, of a propeller, consisting of a hub composed of two parts, said parts being mounted upon the shaft obliquely with relation to the longitudinal axis thereof, blades having tenons terminating in semi-elliptical or curved ends fitting in sockets in the opposing faces of the sections of the hub, said blades being arranged at an angle corresponding to that of the hub relatively to the longitudinal axis of the shaft, and bolts securing the blades to the hub-sections.

Robert S. Peabody, of Philadelphia, was awarded patent No. 562,020, on a screw propeller, his claim being as follows:

1. The combination with a screw-propeller and an imperforate tubular rim surrounding the same, of front



and rear walls applied to said rims near the respective faces of the propeller and provided respectively with inlet openings near the hub of the propeller.

2. The combination with a propeller and an imperforate tubular rim surrounding the same, of a front wall applied to said rim near the face of the propeller-blades and provided near its center with inlet-openings, a rear wall applied to said rim and provided near its periphery with outlet openings, and curved inclined blades carried by the inner face of the rear plate and extending into proximity with the outlet-openings.

The patent on a boat propeller (No. 561,956) was given to Charles B. Augur, of Turin, N. Y., his claim being as follows:

1. The combination in a hand propelling device for rowboats, of a yoke B and B', the journal-box E, integral with the part B, the shaft carried therein, recesses D in the yoke-section B', designed to be clamped over the ribs of the boat, and the screws to clamp the yoke-sections to the gunwale.

2. In combination with the yoke-sections as described, the integral journal-box and shaft carried therein, the paddle-blades held between the plates K and L, the longitudinal corresponding edges of said blades turned up at an angle.

3. In combination with the yoke-sections designed to be clamped over the ribs to the gunwale of a skiff, the steel rods S secured to the yoke, and a screen T having pockets designed to receive said rods.

The battleship Massachusetts is now in commission.



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CLEVELAND, O., JUNE 25, 1896.

AN intoxicated individual has placed himself in a serious predicament by committing mutiny on the steamer City of Chicago in Lake Michigan. He was placed in irons and is now in jail at St. Joseph, Mich., charged with attempting to shoot an officer on the high seas. The offense carries with it punishment more serious than that inflicted on many murderers.

PRESIDENT CHARLES F. THWING, of Western Reserve University, has contributed an able article on Ohio and Cleveland to the current number of Harper's Magazine, which, however, is sadly marred by his reiteration of that moss-grown misconception that Cleveland is the second greatest shipbuilding port in the world. Cleveland is hustling to maintain a fresh-water pre-eminence which is in itself now open to some dispute.

A STEAMER and barges have just delivered 2,000,000 feet of Canadian lumber at Bay City planing mills, where it will be worked up. Formerly all the rough lumber sawed in Bay City was sent down to Lake Erie ports, but now most of the available sites along the Saginaw River are occupied by mills, and not only Canadian logs, but sawed lumber, is taken there. Will the same rule apply later to the iron ore regions of the Lake Superior district, and will it, in years to come, team with blast furnaces and rolling mills? The daily press at the head of the lakes seems to think such a condition will obtain before many years, and while the vast plants in the lower lake territory will not be abandoned, it is by no means an improbability that a large quantity of iron ore will in time be worked up nearer its source of production.

ELSEWHERE will be noted a move by Engineer-in-Chief George W. Melville, to experiment with cast steel, in order to ascertain if it will not answer as well as forged steel for many purposes, including that of shafting for light war vessels. The idea is not looked upon with favor by local experts, who consider that too much depends upon the parts of engines as now used, and that where one important part is placed at right angles to another working with it the liability to breakage would be too great to risk, economy being the only incentive. This is very likely to have one result, and that is a reduction in the price of steel forgings in the general trade, and in cases where the government is willing to relax somewhat the rigidity of its requirements relating to inspection. Some of these requirements involve a heavy incidental expense which materially augments the prices that have to be charged on steel forgings, when other arrangements could be made which would afford the government the same protection, and still be less burdensome upon the contractor.

SHIPMENTS OF IRON ORE FROM LEADING DISTRICTS.

For a number of years we have regularly ascertained the annual shipments of iron ore from the leading iron ore districts of the country. These shipments in the last three years, including the consumption by local furnaces, were as follows in gross tons:

Shipments of iron ore from leading districts.	1893. Gross tons.	1894. Gross tons.	1895. Gross tons.
Lake Superior mines of Michigan and Wisconsin	4,621,987	5,008,246	6,582,134
Vermilion Lake and Mesaba mines of Minnesota	1,438,555	2,740,686	3,856,134
Missouri mines	60,862	14,147	49,454
Cornwall mines, Pennsylvania	439,705	371,710	614,598
New Jersey mines	328,028	277,483	280,417
Chateaugay mines on Lake Champlain	29,584	10,000	20,937
Crown Point mines, New York	19,001	5,190	6,339
Port Henry mines, New York	153,902	59,656	166,965
Other Lake Champlain mines, New York	1,570		10,595
Hudson River Ore and Iron Company	38,442	12,334	13,089
Tillie Foster mines, New York	27,623	66,953	41,216
Forest of Dean mines, New York	18,185	12,510	6,881
Salisbury region, Connecticut	17,024	14,000	11,402
Alleghany county, Virginia	175,140	142,808	209,619
Cranberry mines, North Carolina	9,098	300	2,019
Tennessee Coal, Iron and Railroad Company's Inman mines in Tennessee	73,428	26,477	19,900
Tennessee Coal, Iron and Railroad Company's mines in Alabama	722,976	813,578	1,186,999
Calhoun, Etowah and Shelby counties in Alabama	200,370	81,933	218,819
Total of the above districts	8,375,430	9,658,020	13,302,517

The Lake Superior mines which shipped the largest quantities of ore in 1895 were the following: The Norrie mine, in the Gogebic range, 743,168 tons; Chapin, in the Menominee range, 618,371 tons; Superior, in the Marquette range, 342,097 tons, and Angeline, in the same range, 313,556 tons; Chandler, in the Vermilion range, 605,024 tons; and Lone Jack and Oliver, in the Mesaba range, 500,377 tons.

From reports which we have received from the leading producers of iron ore concentrates we learn that the quantity of this kind of ore that was produced in 1895 amounted to 33,858 gross tons, while the shipments during the same year amounted to 56,727 tons. At several of the plants no concentrates at all were produced in 1895, the shipments being made from the stock piles.—Annual Statistical Report American Iron and Steel Association.

CURRENT FREIGHT STATISTICS.

From the opening of navigation until June 1 the coal shipments up the lakes amounted to 409,491 tons. For the corresponding period in 1895 the shipments were 47,424. The earlier opening of navigation and last year's strike account in great part for this difference. This includes all ports between and including Buffalo and Toledo.

Buffalo's lake commerce for the week ended June 20 was as follows: Receipts—wheat, 655,046 bu.; corn, 572,800 bu.; oats, 2,183,716 bu.; flaxseed, 203,322 bu.; flour, 208,887 bbls.; copper, 5,955 tons; iron ore, 20,842 tons; lumber, 8,814,000 feet; lath, 500,000; shingles, 4,700,000. Shipments—coal, 77,085 tons; cement, 21,710 bbls; salt, 5,573 bbls; sugar, 30,076 bbls.

Marquette ore shipments for the two weeks ending June 20 were 117,871 tons.

Gladstone shipments for the week ending June 20 were: Ore, 13,350 tons; grain, 100,000 bu.; lumber, 800,000 feet; cedar, 52,000 pieces; pig iron, 1,175 tons.

From all upper lake ports there was shipped to June 1, 1,695,540 gross tons of ore, which is quite a little in excess of last year's shipments to the same date. Lake Superior ports—Duluth, Superior, Ashland, Two Harbors and Marquette—sent down 938,493 gross tons to June 1 last year; this year, according to the report of tonnage through the Sault canals, they shipped 1,199,361 gross tons to the same date, or 260,000 tons more.

CAPITAL IN IRON MINING.

The amount of capital invested directly on account of the iron ore deposits in Lake Superior is as follows: Capital in mines, \$96,329,122; capital in docks and their equipments at Lake Superior and Lake Michigan ports, \$14,185,665; capital employed exclusively in railroad transportation from mines to shipping ports on Lakes Superior and Michigan, \$32,364,594; floating capital on the lakes used in transporting ore from Lake Superior and Lake Michigan ports to between Toledo and Buffalo, inclusive of both, \$15,492,880; capital employed exclusively in carrying ore from Lake Erie docks to furnaces, \$28,193,617. The total is \$233,242,085. At the expiration

of this year the Lake Superior region will have produced in excess of 100,000,000 gross tons of ore, of which 75 per cent has been mined within the past ten years.

COMMANDER SIGSBEE ON FRESH WATER.

The Great Lake region is honored with a visit from Com. Charles D. Sigsbee, U. S. N., hydrographer, who came to Cleveland on Sunday, and after spending Monday in visiting the prominent representatives of lake interests, left Tuesday morning as the guest of Capt. Thomas Jones, of the steamer Iroquois, for a trip to Duluth. Com. Sigsbee stated, during his call at THE RECORD office, that he expected to return from Duluth to Sault Ste. Marie, whence he will radiate in various directions, as he thinks in this manner he can get into touch with the greatest number of vessel masters in the limited time he has at his disposal. Com. Sigsbee expects to spend from two to three weeks on the lakes. While in Cleveland he was the guest of Ensign W. C. Cole, who is in charge of the Cleveland Branch Hydrographic Office.

TIME RECORDS OF STEAMERS WITH TOWS.

The Ashtabula Beacon, in its issue of last Friday, printed a statement that the steamer Aurora and consort Aurania made the last trip from Ashtabula to Duluth and return in 7 days and 22 hours, bringing down 4,550 tons of ore, which it stated, was 10 hours better time than ever made heretofore by a steamer and consort. The Beacon omits to state whether this time was taken from arrival at Ashtabula on one trip till arrival on the next, but as it states that the time included 12 hours' loading at Duluth, the inference is that the time was taken from departure from Ashtabula till arrival on the next trip. If so, these figures are open to question as record breakers. The Mariska, towing the Malta, has a record of 7 days, 19½ hours from Two Harbors to Ashtabula and return to Ashtabula, which includes at least 12 hours' unloading time, the capacity of steamer and tow being considerably more than the amount given above. The whalebacks, Pathfinder and Sagamore, also both large carriers, made the same trip in 7 days 13½ hours. The steamer Sitka, with a barge in tow, has just made a record of 7 days 17 hours from Conneaut to Two Harbors and return.

THE FREIGHT SITUATION.

The freight situation shows a more bearish outlook at present than it has at any time previous during the season. The ore rate from the head of Lake Superior has dropped to 80c, with 75c being paid from Marquette and 55c from Escanaba. This condition of affairs is almost certain to continue until August, and may last for two months. Iron ore sales are brightening up, and while no more large blocks have been disposed of appearances indicate that a large amount will be sold during the latter half of the season. Shipments of ore are already considerably ahead of last year, and the slackening down was to be looked for; but there is still every reason to believe that this year's output will exceed 10,000,000 tons.

The weakness in the ore rate is partially due to the reduced shipments of grain, and the consequent falling off in rates, the Duluth-Buffalo wheat rate being weak at 2¼c, and the Chicago-Buffalo corn rate none too strong at 1½c.

Coal freights are in pretty good shape considering the large quantities already shipped, and that the cardumping machies afford so much better dispatch than formerly in loading. The fact that sales have been made at low prices has a tendency to keep up shipments. West Virginia coal is getting into the Northwest by all rail hauls, but this does not seem to affect the volume of lake traffic. The Norfolk & Western has made a rate of \$3.25 per ton from the Pocahontas district to St. Paul and Minneapolis, and the Chesapeake & Ohio has in turn made a rate of \$3.50 per ton on run-of-mine gas coal, from West Virginia to Winona, Minn. This is getting some of the business away from the Pittsburg district. West Virginia coal is also making some inroads on the Pittsburg districts lake trade, the B. & O. having made the rate from Fairmount, W. Va., to lake ports f. o. b. vessel \$1.05, which is, its competitors claim, a cut of about 15c. Lake rates remain about the same. Ohio ports pay 35c to Lake Superior on soft coal, and Buffalo 30c on hard. On soft coal to Milwaukee 40c is now paid, a slight reduction from former rates. Buffalo pays 45c to Milwaukee and 50c to Chicago.

SHIP BUILDING AND REPAIRS.

NEWS OF THE WEEK.

This seems to be an off season just now for any new contracts worth mentioning, and nothing additional on this line need be looked for for some weeks to come. It is stated that the Montreal Transportation Co., of Kingston, is about to lay the keel of another large barge at Kingston, to cost \$15,000, and carry 70,000 bushels of wheat on 14 feet draft, but the report lacks confirmation. Additional delay has been caused in the delivery of the new steel canal boats building at Elizabeth, N. J., for the Cleveland Steel Canalboat Co., by the fact that the builders made the beam of the barges 18 feet, instead of 17 feet 2 inches, as called for by the contract. The steamer is all right. The error was discovered only after a steamer and three barges had been delivered, and they will have to be returned to the Crescent Shipyard, to be drawn in to the beam called for in the contract. Ten inches seems a trifling, but it is just enough to prevent the boats from getting through the Erie canal. The delay is exasperating to the Cleveland Steel Canalboat Co., which has accumulated a quantity of freight at both ends of the Cleveland-New York route.

The new Wilson Line steamer for which the Cleveland Ship Building Co. closed a contract a few months ago, to be furnished next spring will be only a few feet longer than the W. D. Rees, but will probably be two feet wider. The question of putting in three boilers, instead of two, as in the Rees, is also being considered. The launch of the big whaleback steamer building at yard of the American Steel Barge Co., West Superior, for the Rockefeller fleet, has been set for the afternoon of Monday, July 6. Her consort will be launched about ten days later. A gang of men is busy lengthening the slip, so as to permit of the launching of the steamer.

Supt. Curr, of the Globe shipyard, Cleveland, expects to be able to send the Sir Henry Bessemer out on her first trip some time next week.

Reiboldt, Wolter & Co., of Sturgeon Bay, have begun the construction of a scow at their shipyard. It is to be 28 x 60 feet, and will be used for pile-driving purposes.

Commodore George Craig launched his new yacht late last week.

LAUNCH OF THE SENATOR.

The big steamer Senator, building for the Wolverine Steamship Co. by the Detroit Dry Dock Co., was very successfully launched at Wyandotte, last Saturday, about the noon hour. Notice had been given that the launch would be private, but about 500 of the company's friends were in the yard, and several hundred others went down the river from Detroit on excursion boats to see the sight. The launch was none the less successful that it was entirely informal. She was taken to Detroit Monday for completion.

The Wolverine Steamship Co., since the death of Capt. E. M. Peck, has for its president Dr. G. W. Roby; Capt. M. W. Humphrey manages the fleet, and other stockholders and directors are Senator James McMillan, C. L. Freer, F. J. Hecker, A. McVittie, the Peck estate and others. The ship was named in honor of Senator McMillan.

The Senator is to be a large carrier, though there are several ships now in service that exceed her in dimensions. She is 424 feet long over all, by 45 feet 6 inches beam, and 28 feet depth of hold. Her engines are of the inverted triplex type, the cylinders being respectively 22, 36 and 58 inches diameter, by 44 inches stroke.

The two boilers measure 13½ x 12 feet, and are tested to 165 pounds working pressure. Her propeller measures 14 feet in diameter, and she is expected to develop 1,400 horse power, driving the Senator at the rate of 13 miles per hour while carrying 4,400 tons on 16 feet draft.

The Senator has twelve hatches, two of which are forward of the pilot house. The latter is thus set far enough aft to afford the captain and wheelmen some protection from the hardships to which they are exposed in heavy weather, and is another concession to the salt water idea. The engines, however, are placed in the extreme stern. The deck is entirely clear from texas to boiler house. Her hatches are extremely wide to afford the greater ease in handling and trimming cargo, but to compensate for this her deck stringer and sheer strakes are ¾ inch thick by 69 and 65 inches wide, being con-

nected at the ends with double straps. With this provision the designers figure that it would be necessary to exert directly against her sides, from the inside, a pressure of 4,329 tons in order to burst her open. This gives a surplus strength of 16 to 1 against any accident, but this must not be understood as the favorite ratio of the builders in all matters.

The Senator's water ballast capacity is 2,052 tons, and the water bottom is divided into five compartments. The pipes are of unusually large size, and the pumps are proportionately powerful, which allows of altering the draft with greater rapidity.

Supt. F. A. Kirby has compiled the following interesting details in regard to the new ship: Her weight approximates about 2,000 tons, or about five tons to each running foot. The plates used in her construction, if laid one on top of the other, would make a column 126½ feet high. If the plates were placed end to end they would measure 5 miles, 211 rods, 2 feet and 10 inches, with an average width of 5 feet. The total length of shape material, beams, angles, etc., used in her construction, if placed end to end, would measure a length of 17 miles, 159 rods, 5 feet and 6 inches. The number of holes punched in the material used was 877,642, and the sum of the diameters of these holes would be 10½ miles. There are 390,140 rivets used, weighing 83.13 tons. The total number of days' work on the ship up to the time of launching was 23,869.

The Senator will be supplied with all the modern improvements, including electric light, engine-room telegraph, speaking tube communication, etc., and will be supplied with stockless anchor on each bow, and an additional anchor astern, to be used in time of emergency without requiring the ship to turn around and head into the sea. This is not approved in ocean practice, but the seas on the lakes are of course not so formidable, and nothing will come over the stern. She will be sailed by Capt. E. B. McQueen, with Mr. Andrew Carter as chief engineer. The builders expect to have her in commission before the first of August.

SMALL STEAMBOATS FOR THE TROPICS.

The Marine Iron Works, Chicago, are at work on orders for small dispatch boats for use on salt water, in the tropics, that company doing the entire work, including hull, machinery and equipment. In addition they are building for the same section, outfits of machinery with fittings and equipment, for the native boat builders.

The small craft referred to differ in some details from the launches seen on our northern fresh waters. The bottoms of the hulls are coppered with fastenings of copper, while the shaft stern bearings, shoe, rudder, propeller wheel, and all outboard work is bronze. A feature in connection with the machinery for these boats is the increased amount of cooling surface required in the condenser, owing to the high temperature of the water in which the boats ply. As a rather inferior grade of wood fuel is all that is obtainable in the majority of cases, and the firemen are not specially active, the design, as well as the capacity of the boilers, necessarily receives considerable attention.

LAUNCH OF A TUG.

The tug which the Ship Owners' Dry-Dock Co. have been building for Joseph Duherst and others, of Huron, is to be launched this (Thursday) afternoon at 2 o'clock. The tug is to be named the O. C. Stedman, in honor of the well-known dock manager at Huron. She is 92 feet long by 19 feet beam and 10 feet depth. She is built of some of the best white oak to be found in Ohio. Her planking is three inches thick, and her bilge keelsons and clamps are four inches in thickness. The bed plate for her 22 x 24 engines is already in. Her boiler 9x15 feet, which has been built by the River Machine Co. (Teare & Thomas), lies on the Front street dock, and will be loaded on a lighter at once and taken to the shipyard, where it will be picked up on the high sheer legs, and placed in position in the floating tug. The machinery will then be fitted in as rapidly as the makers, Messrs. Clough & Witt, can do the work. She will probably be in commission before July is well advanced.

GENERAL REPAIR WORK.

CLEVELAND.—The work at the dry-docks is growing somewhat slack, all three basins being empty last evening. Both dock companies have, however, considerable

work on craft afloat. At the Ship Owners' dry-dock the work on the V. Swain is making good progress, and it is hoped to have her in commission by August 1. The overhauling of her machinery has begun. The steamer Griffin was in the latter part of last week and had her shoe taken off and put on tighter with larger rivets. The Cleveland Ship Building Co. did the work.

At the Cleveland dry-dock a great deal has been accomplished on the schooner H. A. Kent, and she will soon be ready for docking. The tug Kunkle Bros., of Ashtabula, was in for a new wheel, and the Allie May was docked for minor repairs. The steamer Reynolds, which had several plates of her bulwarks astern damaged at Buffalo, was at the Globe shipyard for repairs.

CHICAGO.—At the Chicago Ship Building Co.'s shipyard the Anchor Line steamer Conemaugh was in dock for fastening wheel and a new key, and the schooner John McGee for some new bottom plank and calking.

At Miller Bros.' shipyard the steamer George Dunbar is in dock for repairs to stern bearing and rudder; the tug Rosaline for a new stern pipe, some general repairs and calking; the steam yacht Sentinel for some calking, bottom scraping and painting, and two new sea-cocks; the steamer R. J. Gordon for some repairs and calking.

MILWAUKEE.—The steamer Frank Woods arrived last Thursday evening from St. Joseph to receive a new Sheriffs wheel and hoisting gear. The Woods has been converted into a double-decker. She is under charter to the Graham & Morton Transportation Co. for the Benton Harbor and Milwaukee route until December 10. The steamer Egyptian was in the Milwaukee Dry Dock Co.'s south yard dock to have some leaks stopped.

WEST SUPERIOR.—The American Steel Barge Co.'s dry-dock has so far this season been rushed with orders, working day and night a great part of the time. Capt. Kidd has gone to Montreal with twelve expert riveters to assist Capt. McDougall in the work of cutting the steamer Colby and barge 110 in two, so they may be brought through the St. Lawrence canals. The 201 and 202 will probably be brought up without any difficulty on account of their smaller size. The tug J. W. Ward, from Ashland, is here to receive a new sternpost.

DETROIT.—The steambarge John H. Pauly is at Oades' yard for general repairs. The steamer Ida, which lately blew out her cylinder head and sustained other minor injuries to her machinery, is at Hodge's for repairs.

The Iron Age has at last received her new boiler, and will re-enter the ore trade at once.

STURGEON BAY.—The tug Leatham was the first boat to be placed in the floating dry-dock of Reiboldt, Wolter & Co. She went on Tuesday evening of last week to have her stern-bearing tightened. In taking the stern-bearings off the under half was dropped in the bay, and a new one had to be provided at Ives Bros.' foundry. She was followed by the tug Wright, which received some repairs below the water line. The next in order was the schooner Kanters which was wrecked, abandoned, and afterwards released.

REPAIR NOTES.

The steamer Panther has been receiving repairs at Craig's, and the Massasoit at Gillmore's dry-dock, Toledo.

The steamer Niko, which knocked off her fore-foot in Buffalo creek, has completed repairs.

The schooner John M. Hutchinson has nearly completed a \$9,000 rebuild at Alex. Anderson's yard, Marine City, and has been towed to Port Huron for docking.

The engine of the Gogebic was repaired at Ashtabula last week by the McKinnon Iron Works.

The wrecking and repair bills on the Choctaw amount to about \$15,000.

The Big Four Railroad Company has contracted with John Stang to dredge the approaches to their coal docks at Sandusky. The water is not of sufficient depth to allow deep draft vessels to get away without trouble after they are loaded, and two propellers had to be towed out a few days ago, stern first, as far east as the straight channel. The company has a large amount of coal to move to Lake Superior, and they are anxious to have the water deepened as soon as possible. One dredge will work in the slip, and another will dredge out to the government channel. The dock property will also be placed in condition by refitting the north ends and rebuilding where necessary.

CORRESPONDENCE.

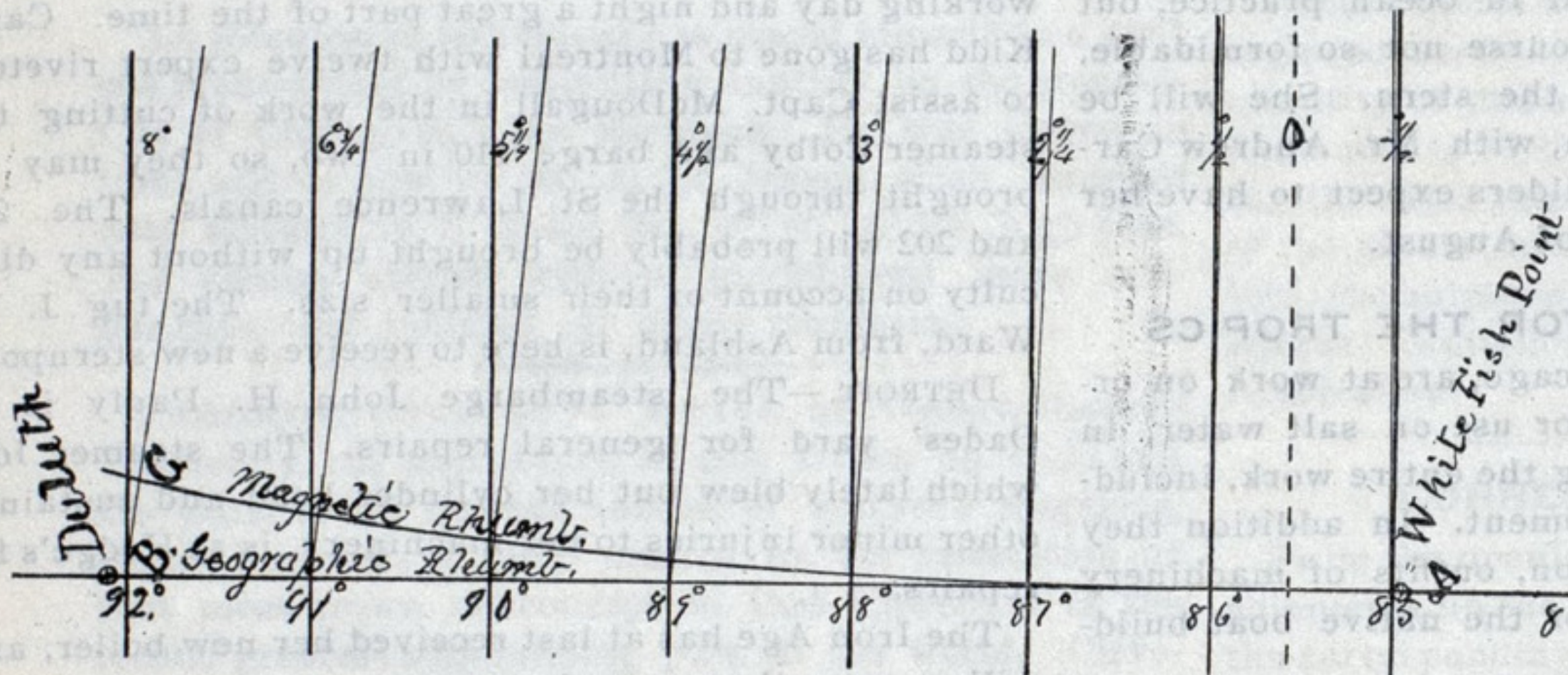
We do not hold ourselves responsible in any way for the views or opinions expressed by our correspondents. It is our desire that all sides of any question affecting the interests or welfare of the lake marine should be fairly represented in THE MARINE RECORD.

NEITHER IS A RHUMB-LINE.

To the Editor of The Marine Record:

In my last communication to you, which appeared in THE RECORD of May the 28th, 1896, under the title of "The Rhumb-Line Controversy," fourteen definitions of the rhumb-line were given in order to make sure that vesselmen on the lakes should not be led by any discussion which had previously taken place into the belief that there is more than one kind of rhumb-lines, as, for example, magnetic rhumb-lines and geographic rhumb-lines. The essence of these fourteen definitions goes to show that the only kind of rhumb-line is the straight line on the Mercator chart, which corresponds to, or is the projection of, the loxodromic curve on the surface of the globe. That is, any straight line on the Mercator chart which does not coincide with a parallel of latitude or a meridian of longitude. Notwithstanding the appearance, in the endeavor to set matters right, of this array of definitions from standard authors, Captain Pearsons, of Ferrysburg, Michigan, replies in your last issue of THE RECORD with some evidence of exasperation, and with these words: "I will show him the two rhumbs, or, if it will be less offensive or less heretical, I will show him the two forms of the same rhumb side by side, and he can see their difference, and how they are derived from the same source."

This statement is accompanied by the following diagram which is cut from the published letter referred to:



It is surprising, after all the definitions that have been given, and all that has been written upon this subject, to find that neither of the lines marked "rhumb" in this diagram is a rhumb-line.

The line A B is described by Captain Pearsons as running due east and west, and is shown as a parallel of latitude in the diagram. It is unfortunate that, out of the thousands of straight lines he might have picked out to represent the geographic rhumb-line, he should have selected one of the only two classes of straight lines that are not rhumb lines.

The identity between the rhumb-line on the Mercator chart, and the loxodromic curve on the sphere has been abundantly pointed out in the definitions already referred to, and, as is well known, a loxodromic curve forms a kind of spiral on the globe, cutting all of the meridians under the same angle and approaching nearer and nearer to the pole. A line running due east and west, or a parallel of latitude, cannot therefore be a rhumb-line, because it does not gradually approach the pole. According to the literal sense of the word loxodromic, *loxos*, slanting, oblique, and *dromos*, a running course, a parallel of latitude would be excluded from consideration as a rhumb-line. Here are some definitions to establish this point:

Rhumb-Line. A line described by the course of a ship sailing steadily in any one direction except toward any of the cardinal points: same as loxodromic curve. (Ogilvie's Imperial Dictionary.)

Rhumb-Line. A line prolonged from any point of the compass or a nautical chart, except the four cardinal points: or it is a line which a ship, keeping in the same collateral point or rhumb, describes through its whole course.

The great property of the rhumb-line or loxodrome, and that from which some authors define it is, that it cuts all the astronomical meridians under the same angle. The angle is called the angle of the rhumb or the loxodromic angle. The angle which the rhumb-line

makes with any parallel to the equator is called the complement of the rhumb.

An idea of the origin and properties of the rhumb-line, the great foundation of navigation, may be conceived thus: a vessel beginning its course, the wind wherewith it is driven makes a certain angle with the meridian of the place; and if it is supposed the vessel runs exactly in the direction of the wind, it makes the same angle with the meridian which the wind makes. For example: a wind that is north-east, and which of consequence makes an angle of 45° with the meridian, is equally north-east, wherever the wind blows, and makes the same angle of 45° with all the meridians it meets. A vessel therefore, driven by the same wind, always makes the same angle with all the meridians it meets with on the surface of the earth. (Falconer's New Universal Dictionary of Marine, London.)

Rhumb Line. If the vessel sails either due east, west, north or south, she evidently describes a circle on the earth's surface; but if she sails in one constant direction toward the same intermediate point of the compass, thus preserving a line which cuts the successive meridians at a constant angle, she will describe, as any one may see by drawing such a line on the sphere, a spiral. (Encyclopedia of the Sciences by J. P. Nichol, LL. D., London and Glasgow.)

Rhumb-Line. A line described by the ship's motion on the surface of the sea, steering by the compass, so as to make the same or equal angles with every meridian. These rhumbs are *spiral lines* proceeding from the point where we stand, and winding up the globe of the earth, until they come to the pole, where at last they lose themselves, but in Mercator's charts, and in plane ones, they are represented by *straight lines*. These lines are called *rhumb-lines*. (Etymological Dictionary of the English Language, W. W. Skeat.)

The second line, marked A G in this diagram which purports to show two rhumb-lines, is a curved line. No line which is curved on the Mercator chart can be a rhumb-line, because, as pointed out in the communication of May 28th, the Mercator projection may be said to result from the development on a plane of a cylinder tangent

to the earth along the equator, the various points of the earth's surface having been projected upon the cylinder in such a manner as to satisfy the following condition: That the loxodrome, or ship's track on the surface of the sea, under a constant bearing, shall appear on the development as a straight line.

Captain Pearsons concludes his letter with the statement: "The United States authority, knowing the difference between the ship's track and rhumb-line, put a saving clause into their definition and give us to understand that while the ship makes the angle with all the meridians she crosses, the track is called a rhumb-line." They are quite safe in calling the ship's track the rhumb-line on this condition, for no ship, as we have seen from the preceding discussion, ever sailed on the geographic rhumb, when steered to a constant magnetic course."

I am not aware that it is anywhere stated upon authority that a ship sails along a rhumb-line when steered to a constant magnetic course; on the contrary it is everywhere understood that, in order to pass along a rhumb-line, the ship must be steered to a constant true course. As has heretofore been pointed out, this is accomplished in practice by changing the direction of the ship's head at convenient intervals along the route to compensate for the accumulated change in the variation of the compass in those intervals.

This is the universal practice of mariners, and it must be attended to as rigidly by every captain who carries on trade between New York and Europe as it is on the lakes, for the change of the variation of the compass per one-hundred miles along the transatlantic lanes of commerce between New York and Halifax is greater than on the lakes.

Very respectfully,

G. W. L.

Washington, June 18.

The marine department of the Maryland Steel Works, at Sparrow's Point, Md., has closed down.

THE NEW PROVIDENCE WINDLASS.

Owners contracting for vessels, if they are not thoroughly acquainted with the points of different windlasses offered to the public, should investigate the different styles before making their contracts, so as to be sure to get the best. The American Ship Windlass Co., of Providence, R. I., court the most thorough investigation of their machines, and feel perfectly sure that if the public knew the advantage which their machines have over other styles they would not accept any other style, particularly as the "Providence" machines could be had by the simple trouble of calling specifically for them in the contract. In the "Providence" windlass every point has been provided for by close study of its operation in practical use for over forty years. Their latest style of improved windlass embodies advantages which previous styles have not had, and is up to date in every respect.

TRADE AND INDUSTRIAL NOTES.

The Marine Iron Works, Chicago, report that they have been fairly busy during the past two months, in the line of complete outfits of marine machinery for boat builders and others building their own hulls, the boats ranging in size from 35 to 100 feet, and in style from very light draft paddle-wheel machinery to single-screw deep water work.

The Carnegie Steel Company has decided to build a \$1,000,000 addition to its extensive plant. A site has been selected above the Homestead mills for a large forging and finishing shop to forge heavy propeller and steamship shafts and heavy gun forgings. The plans are nearly completed and contracts are almost ready to be let. The plant will be equipped with hydraulic hammers, presses and other machinery of the best class, making the establishment, it is claimed by the company, without a rival in the world.

The King Bridge Company, of Cleveland, will erect the South Rocky River bridge at this place. The contract was awarded to McAllister & Dall, who sublet the work to the King Bridge Company for \$84,000.

The Lake Superior Power Co., Sault St. Marie, Ont., Canada, intends to establish a plant for the reduction of ores by electricity and the manufacture of calcium carbide.

Good work is being done at the new Pioneer furnace of the Cleveland-Cliffs Co., at Gladstone. Though the rated capacity of the furnace is 30,000 tons a year, a record of 127 tons in 24 hours was made recently.

The H. P. Nail Co., Cleveland, is putting in machinery for the manufacture of weldless chain, trace chain, logging chain, coil chain and other specialties of 1½ inch stock, and smaller will be made.

The Sharon Iron Works, of Sharon, Pa., will build a mammoth steel department, with a capacity of 1,500 tons per day, to its works. It will cost over \$500,000. They will also add a department for the manufacture of rods and wire out of steel.

The lighthouse tender Rose, at Ramsay's yard, Perth Amboy, N. J., has recently been supplied with a Morison suspension furnace by the Continental Iron Works, Brooklyn.

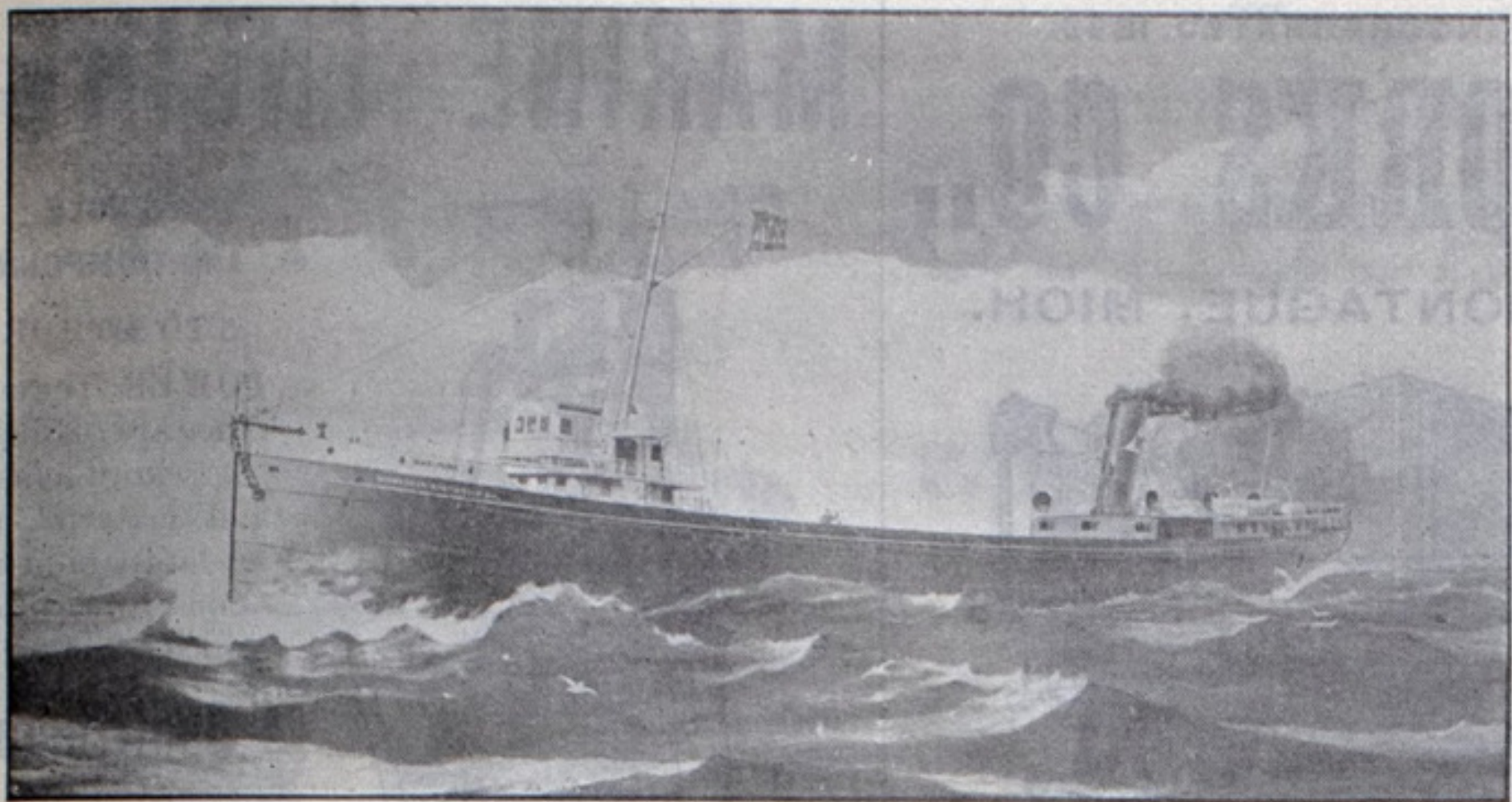
The Gas Engine and Power Co., of New York city has filed at Albany a certificate of increase of its capital stock from \$150,000 to \$600,000. The company's statement shows a paid in capital of \$150,000 and debts only \$5,000. This is the financial part of the extension of business by this company with its new combination recently referred to, the outlook for which is so promising.—Marine Journal.

The Menominee (Mich.) Iron Works Co. is about to erect a foundry 60x100 feet, to be equipped with the latest appliances.

Plans have been prepared for the enlargement of the plant of the Frontier Iron Works, of Detroit, by the addition of a fourth story, 48x148 feet in size. The addition will cost \$7,000.

E. E. Roberts, president and general manager of the Roberts Safety Water Tube Boiler Co., returned Monday from a trip to Pensacola, Fla., where he has been installing one of the company's boilers in the United States revenue cutter Penrose. It was found to work very successfully, as was to have been expected, and Mr. Roberts also picked up other orders.—Marine Journal.

Beeson's Marine Directory for 1896 is full of marine information of great value.—Detroit Evening News.

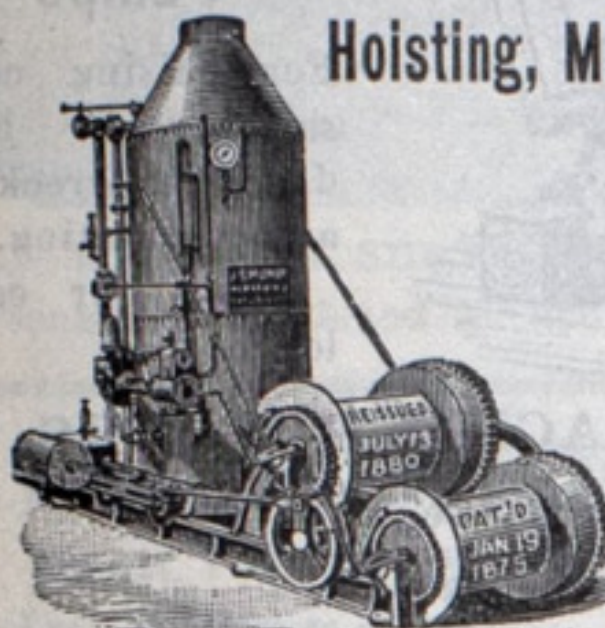


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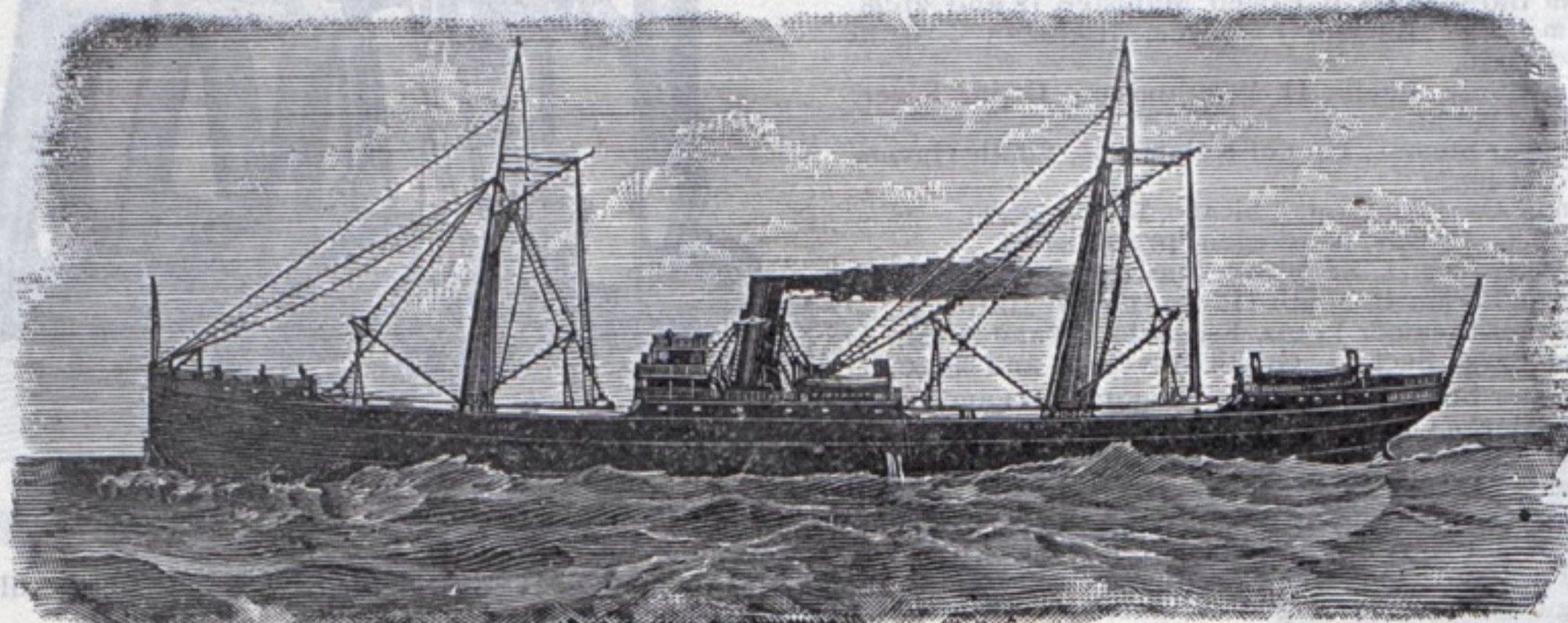
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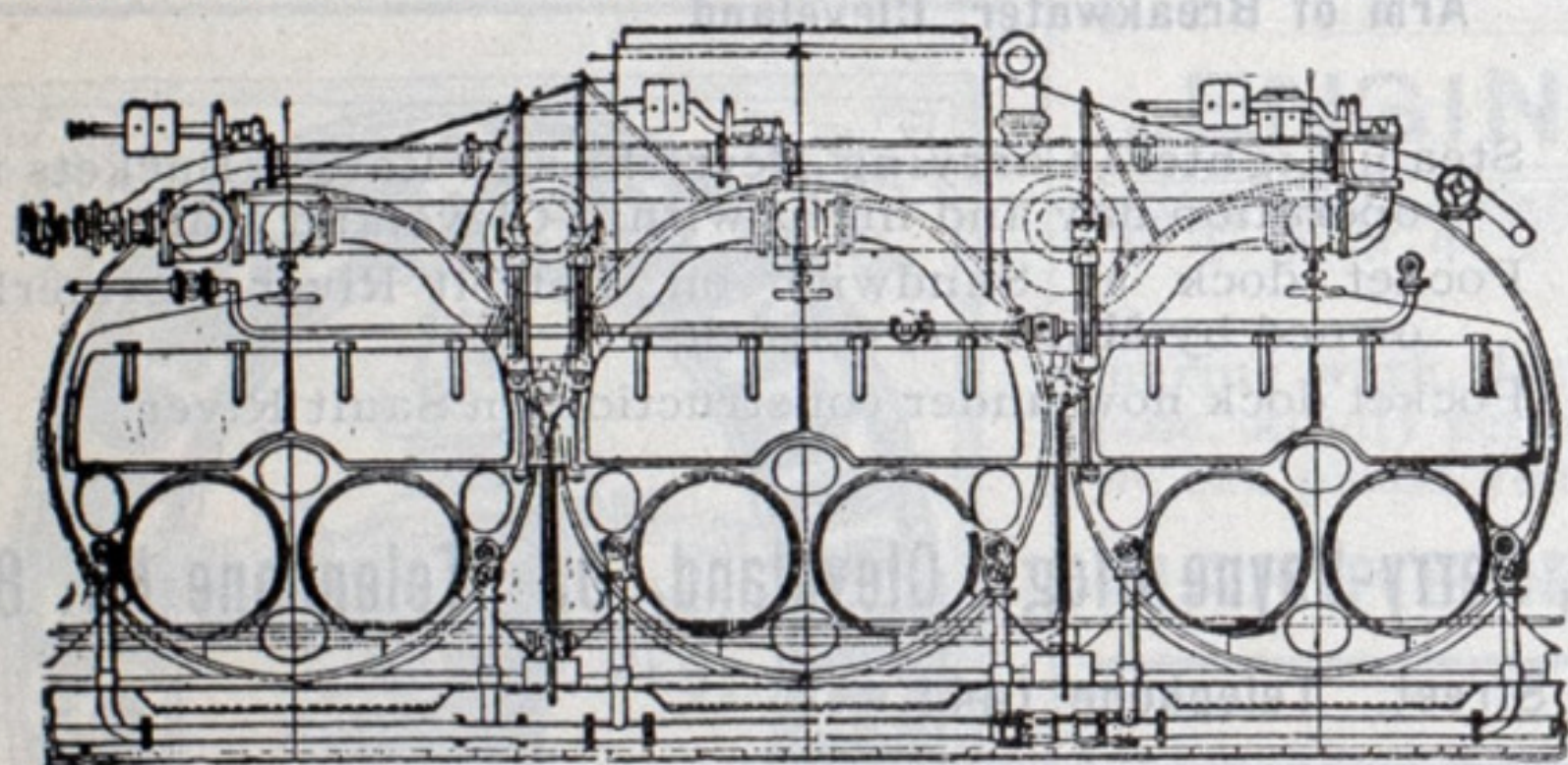
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during the year; thereby reducing the cost of insurance. For such dividends, certificates are issued bearing interest
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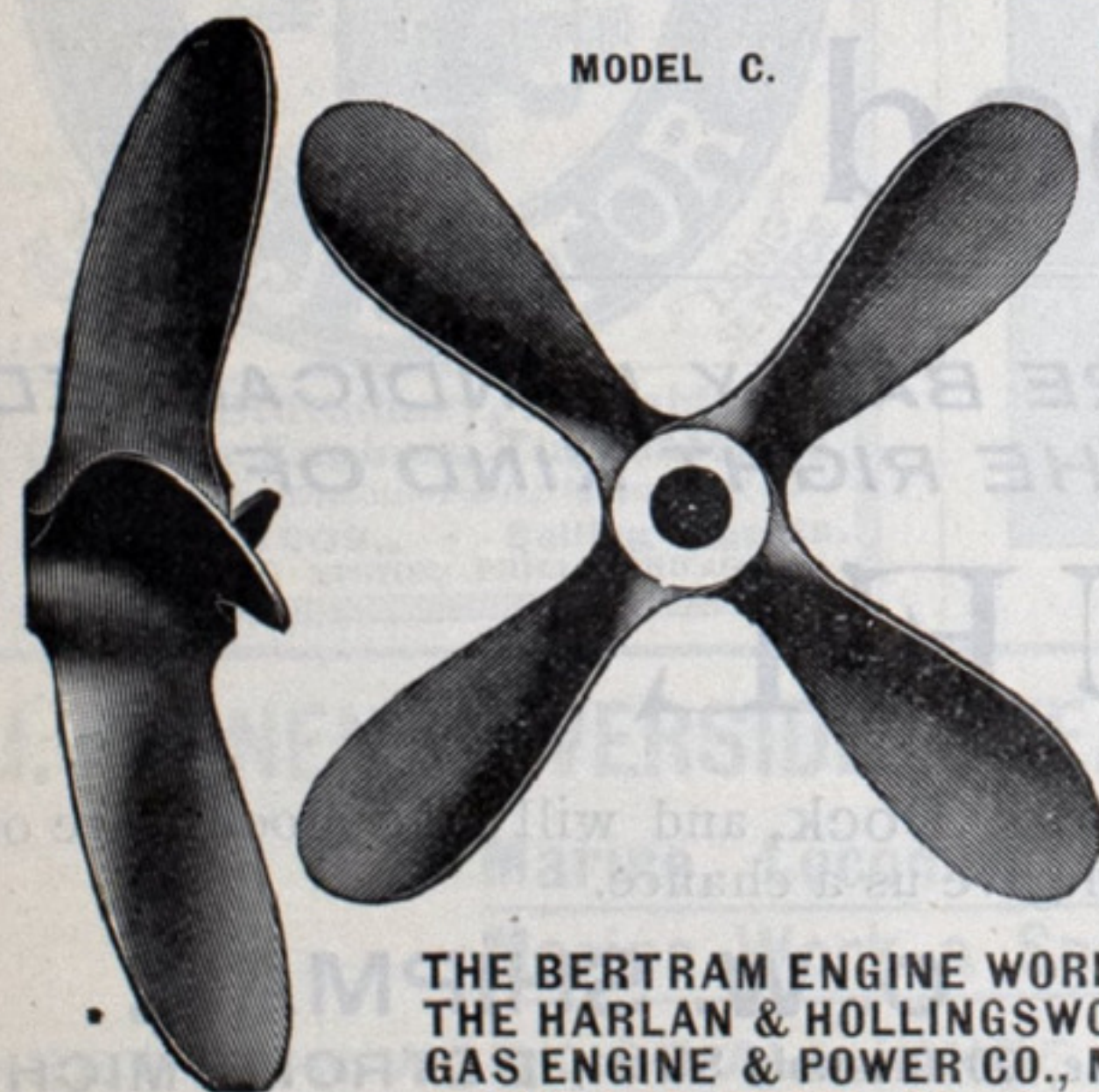
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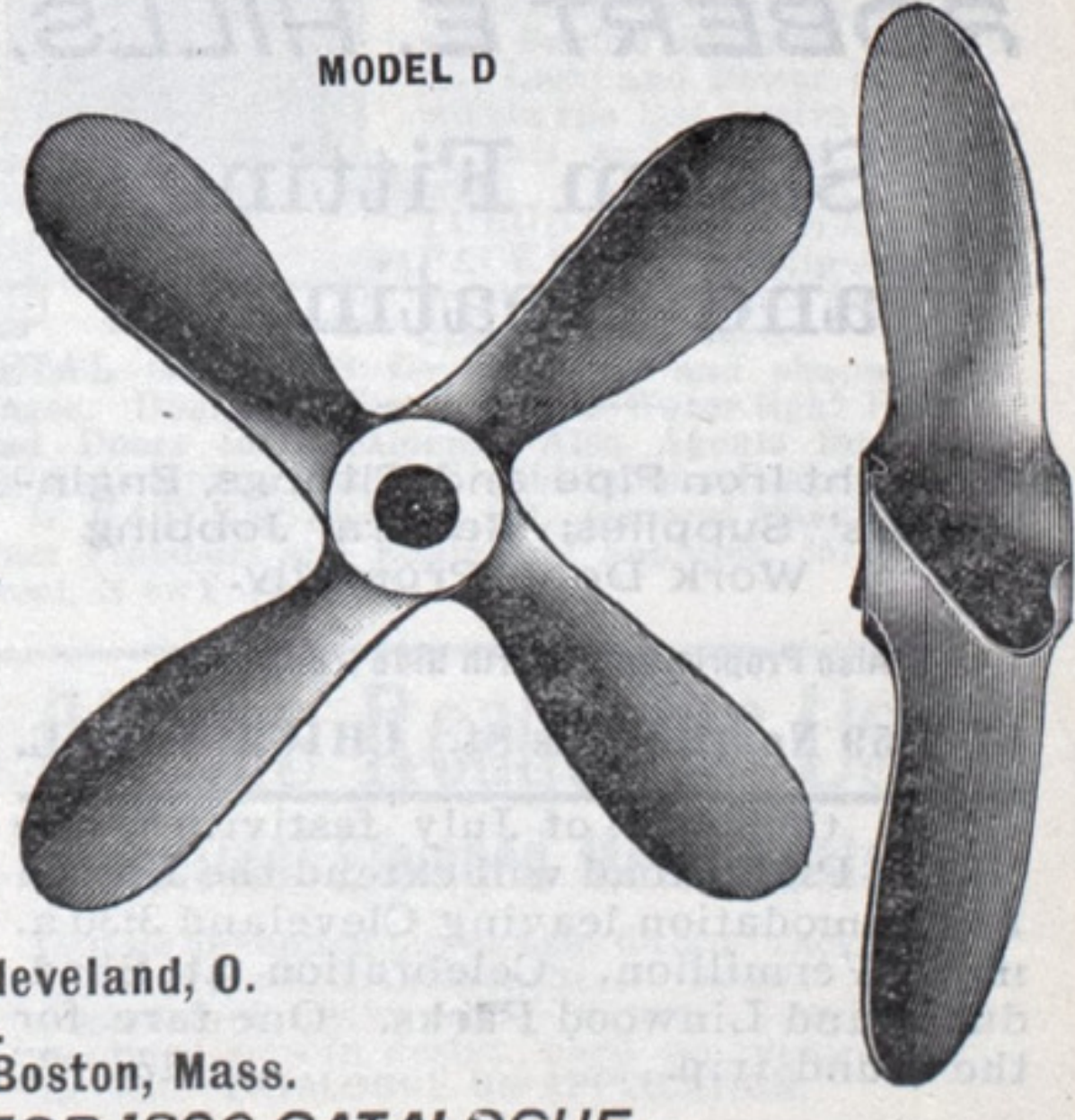
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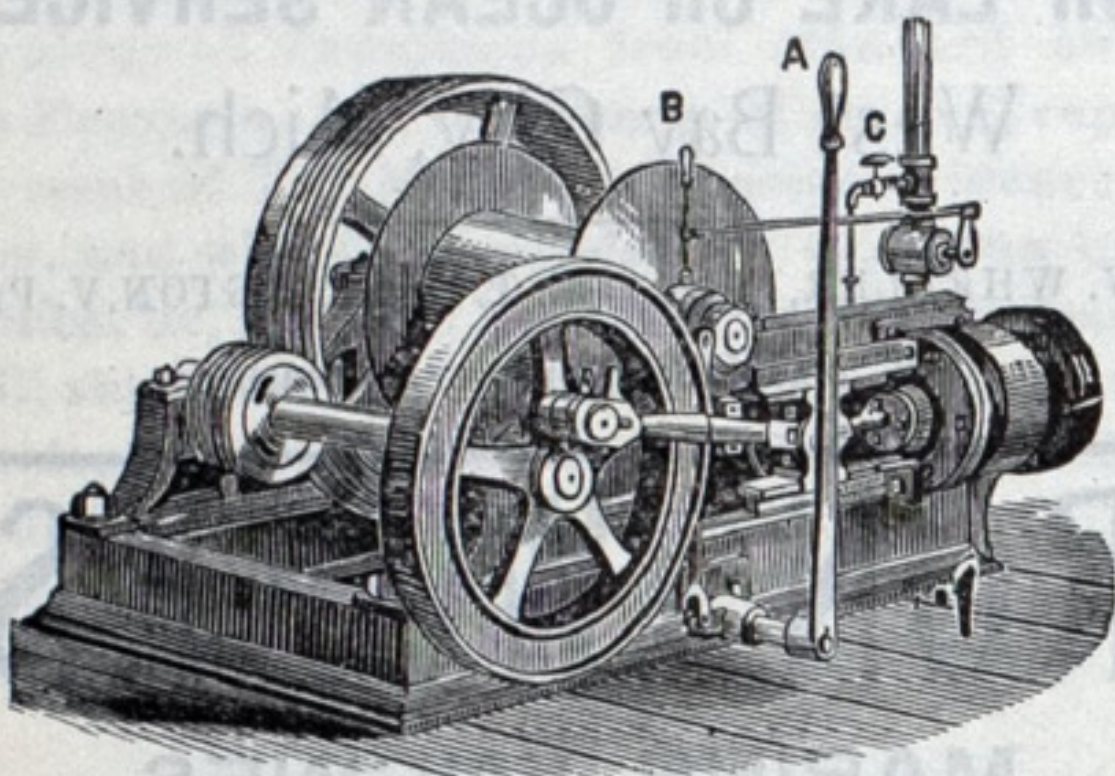
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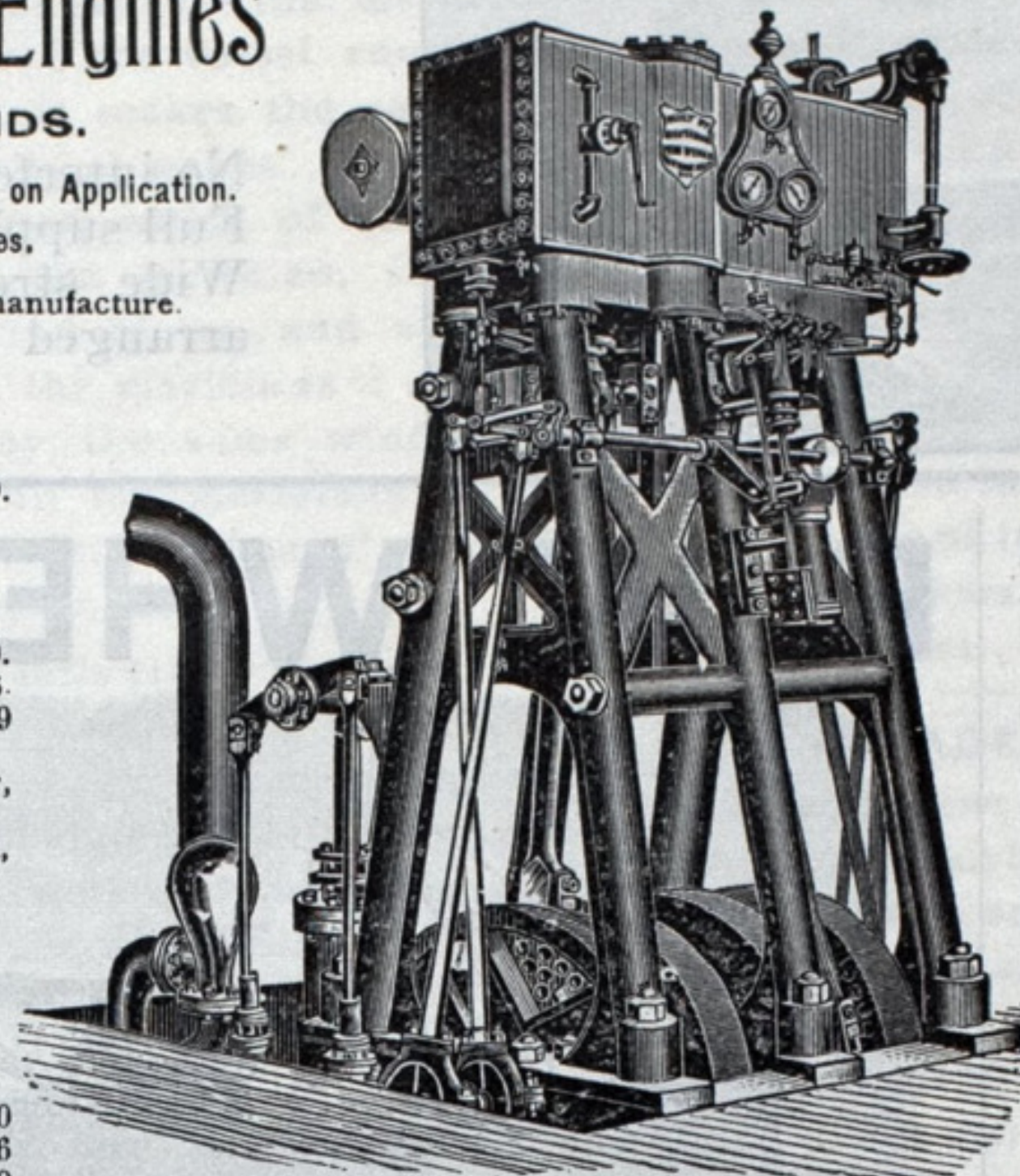
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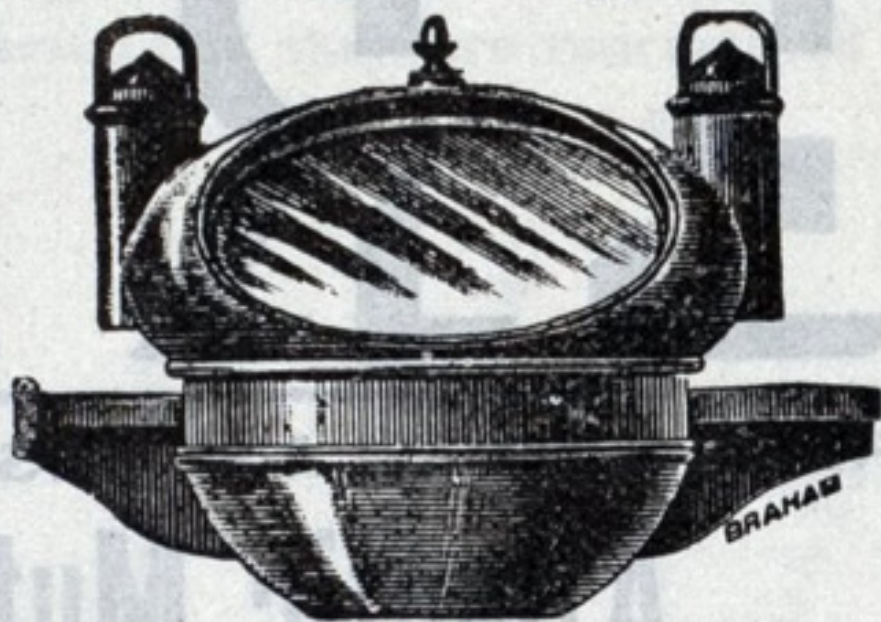
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Passenger Steamer Pilgrim, St. Clair, 14 and 28x20.
Steam Barge Iona, Grand Haven, 24 and 46x42.
Steam Barge M. T. Greene, Chicago, 20 and 36x36.
Steamer H. W. Williams, South Haven, 18 and 36x30.
Steam Barge Mark B. Covell, Manistee, 18 and 30x26.
Steam Barge Isabella J. Boyce, Michigan City, 19 and 32x26.
Steam Barge Luella H. Worthington, Cedar River, 19 and 36x30.
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Tug Peter Coates, Sault Ste. Marie, 10 and 20x16.
Steamer Lorain L. South Haven, 12 and 21x16.
Passenger Steamer Lotus, Escanaba, 16 and 30x24.
Steam Barge Schem, Grand Haven, 21 and 38x36.
Passenger Steamer Bon Ami, Saugatuck, 14 and 28x20.
Steam Barge Charles A. Street, Chicago, 20 and 36x36.
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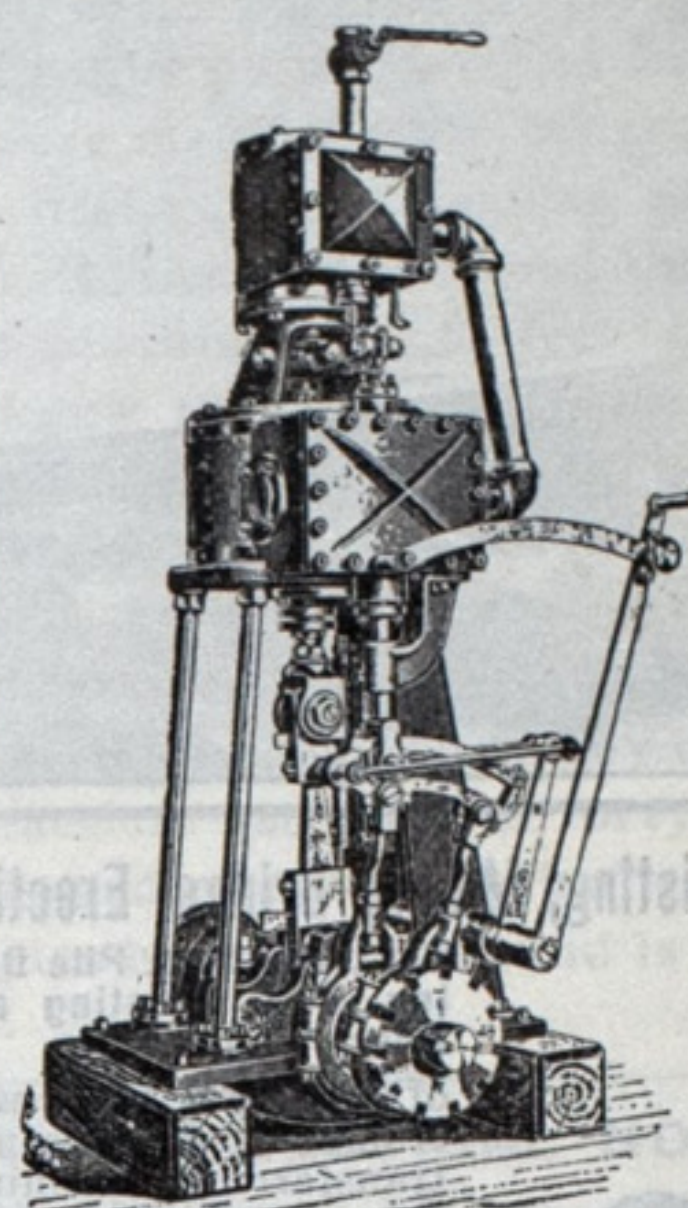
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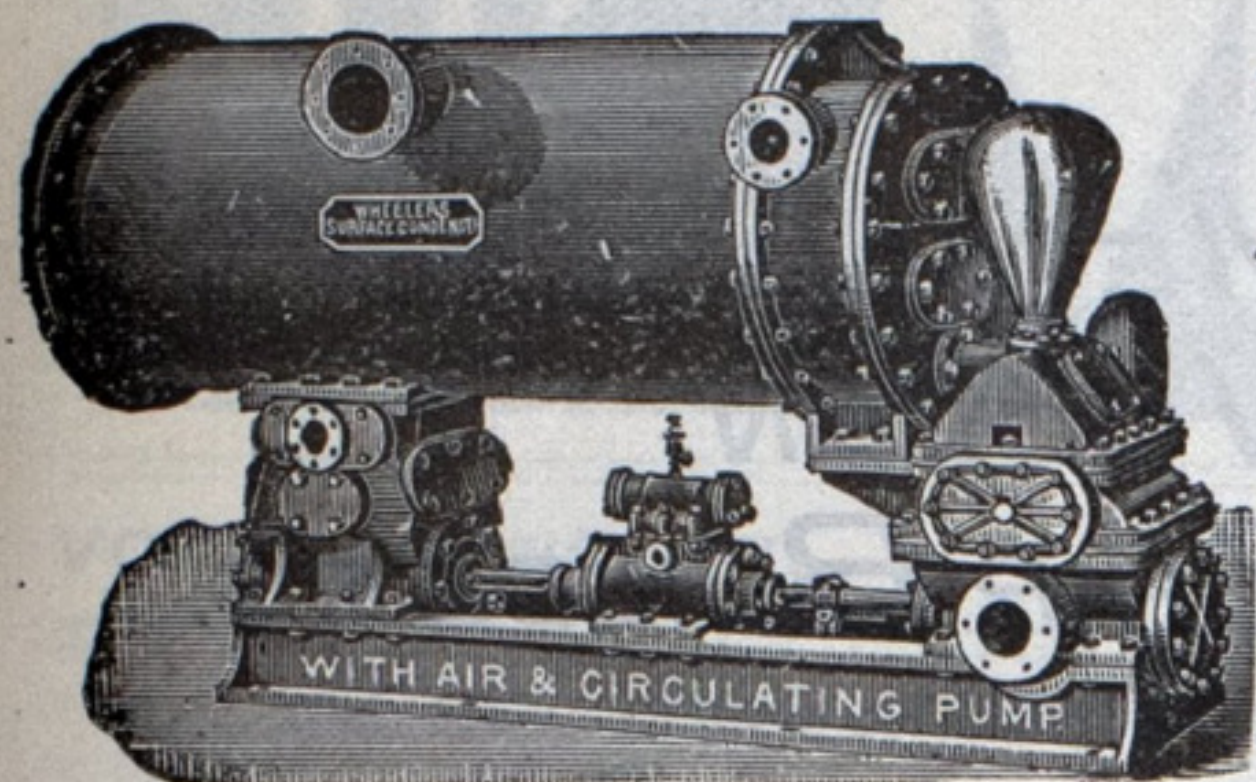
Office, 90 Griswold Street, DETROIT, MICH.

Wheeler Condenser & Engineering Co.,

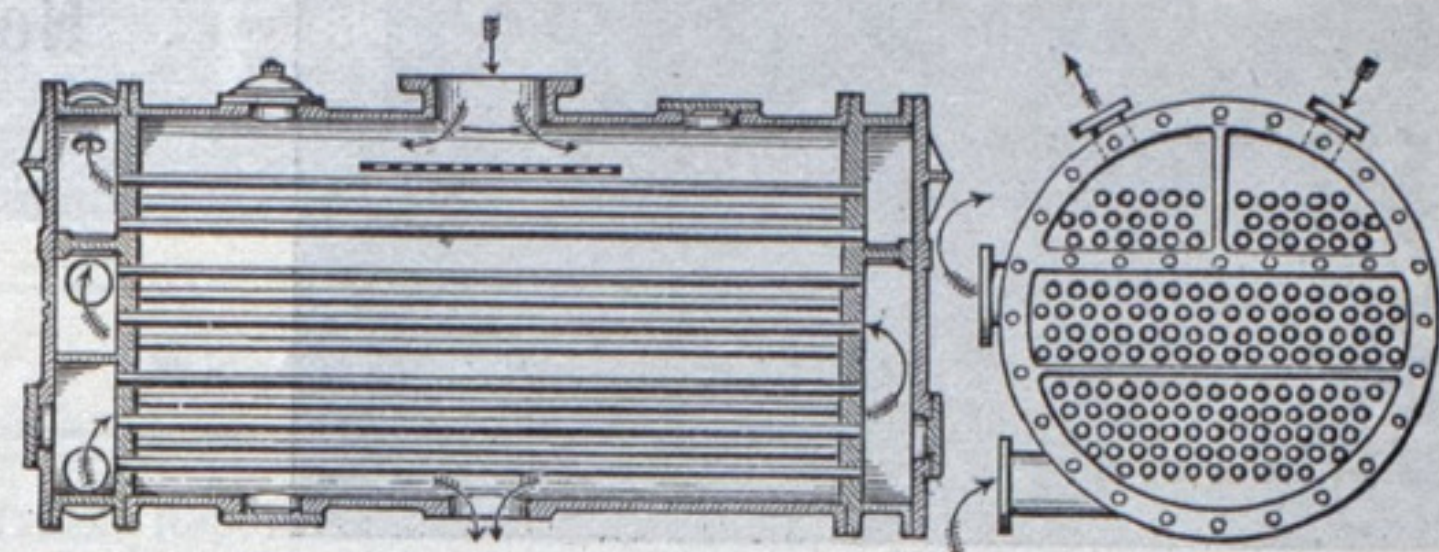
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NAME.	Boiler Inches.	Engine Inches.	Over all	Keel Inches.	Beam Inches.	Depth Inches.
A. G. Van Schaick..	15x78	22x22	82	67.5	14.6	8.1
Protection.....	15x79	22x20	90	77.4	15.8	8.9
Calumet.....	14x75	22x22	79	64.2	17.8	8.6
D. T. Helm.....	14x72	(2) 17x17	83	68	18	9.3
E. P. Ferry.....	12x72	20x20	80	66.8	15	7.6
Black Ball No. 2....	12x72	18x20	73	58.6	15.5	8.4
A. A. Carpenter ..	12x72	18x20	75	60	15.6	8.6
Thomas Hood.....	13x72	18x20	71	59.5	15.6	8.6
J. V. Taylor.....	13x72	18x21	75	60.8	15.6	8.6
Satisfaction.....	12x72	18x20	73	58	15	8
M. Shields.....	12x66	18x20	76	62	14.6	8.2
Rebel.....	10, 6	16x18	66	54	14.6	7.8
	x 60					

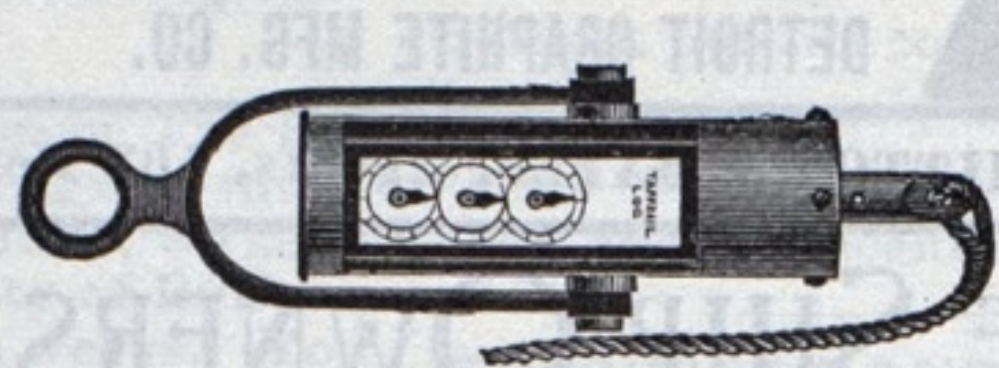
I will be pleased to receive offers at
once for any or all of above tugs.

Yours very respectfully,

J. L. HIGGIE, JR.,

Receiver Vessel Owners' Towing Co.

THE BLISS TAFFRAIL LOG



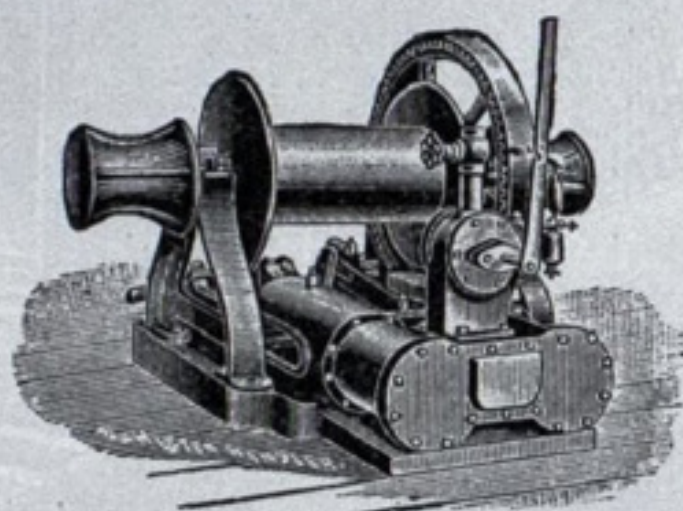
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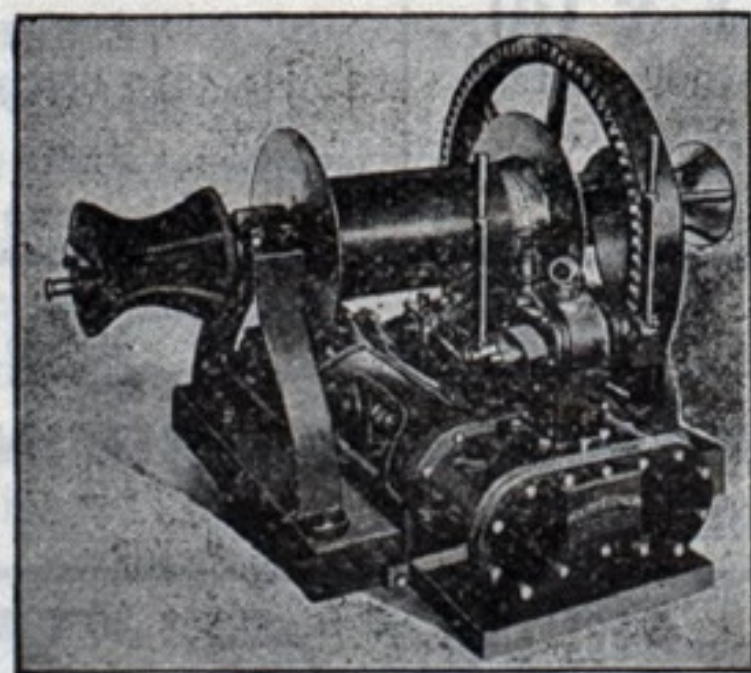
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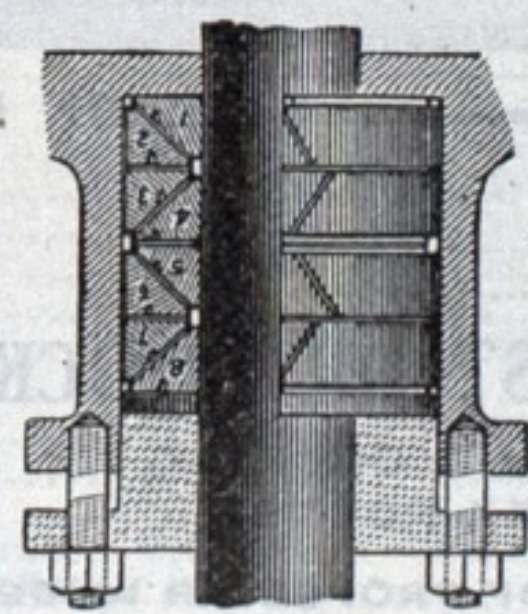
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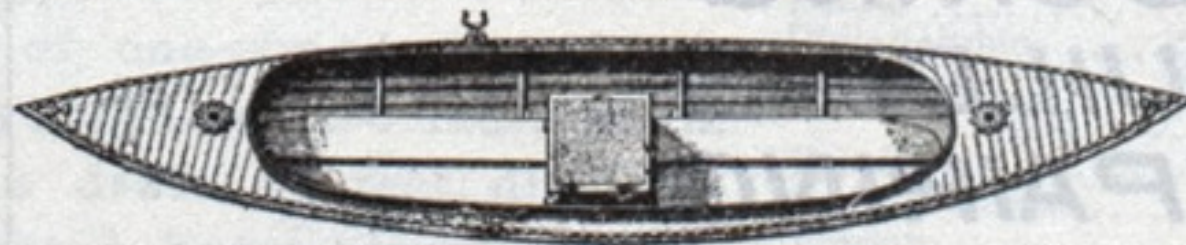


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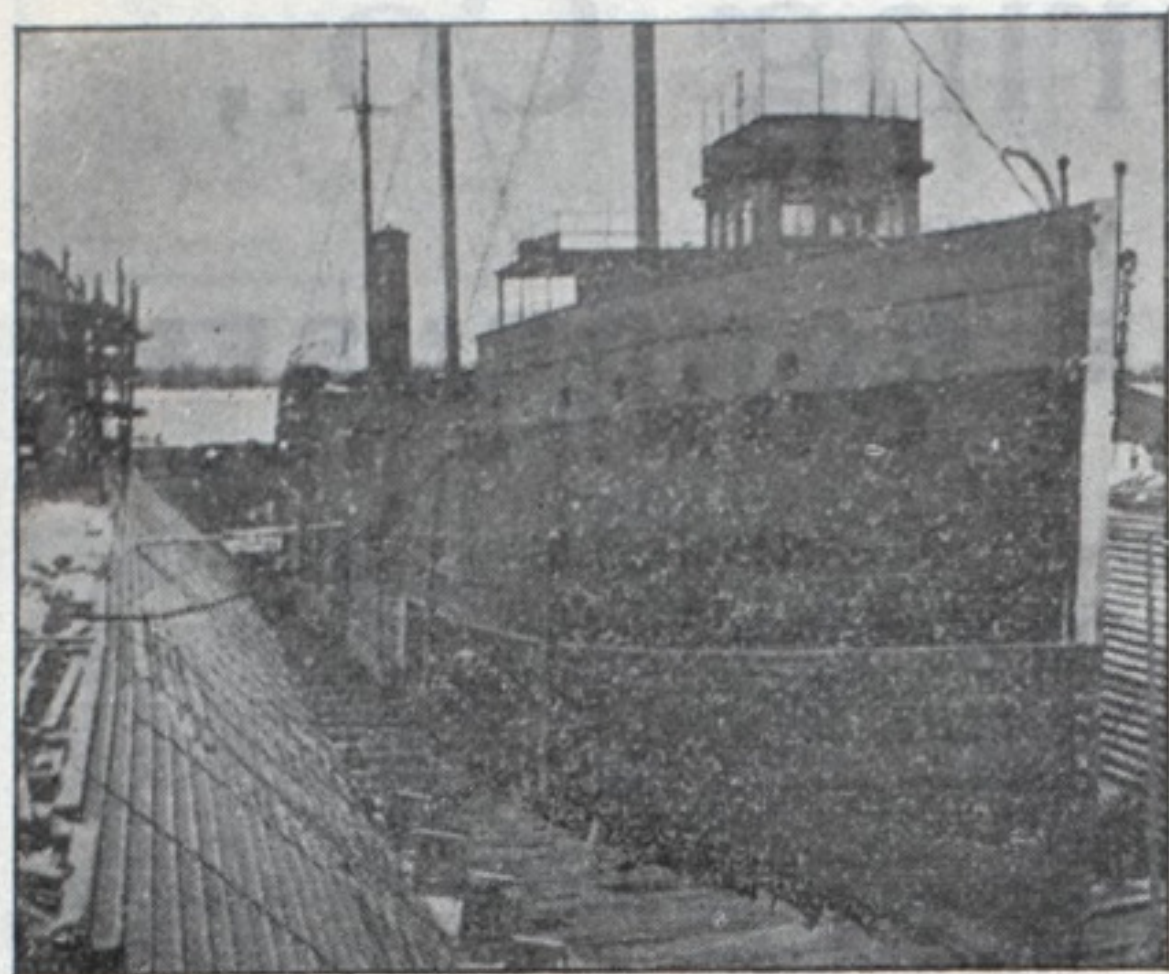
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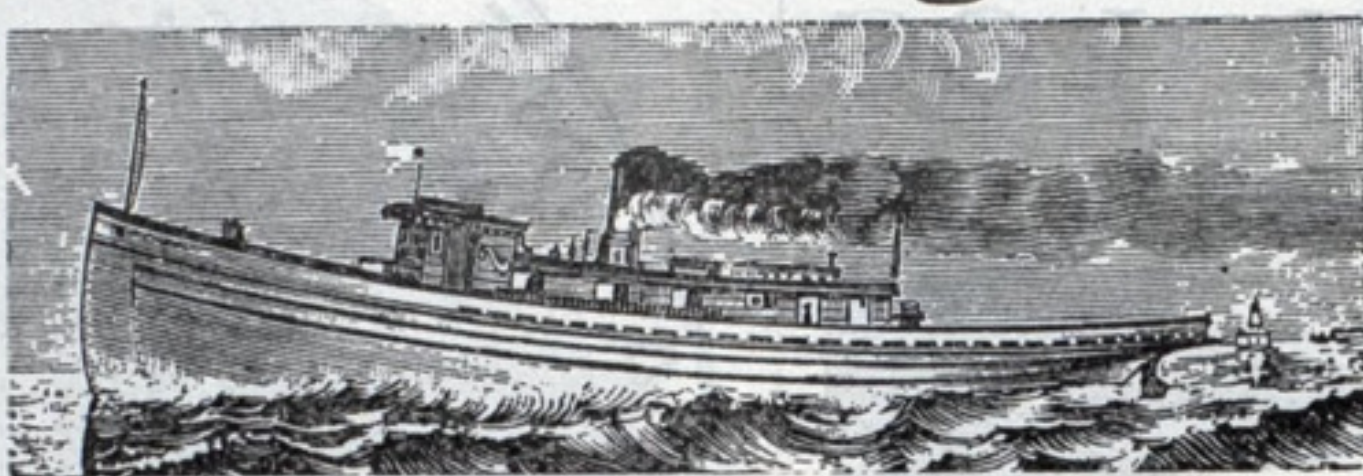
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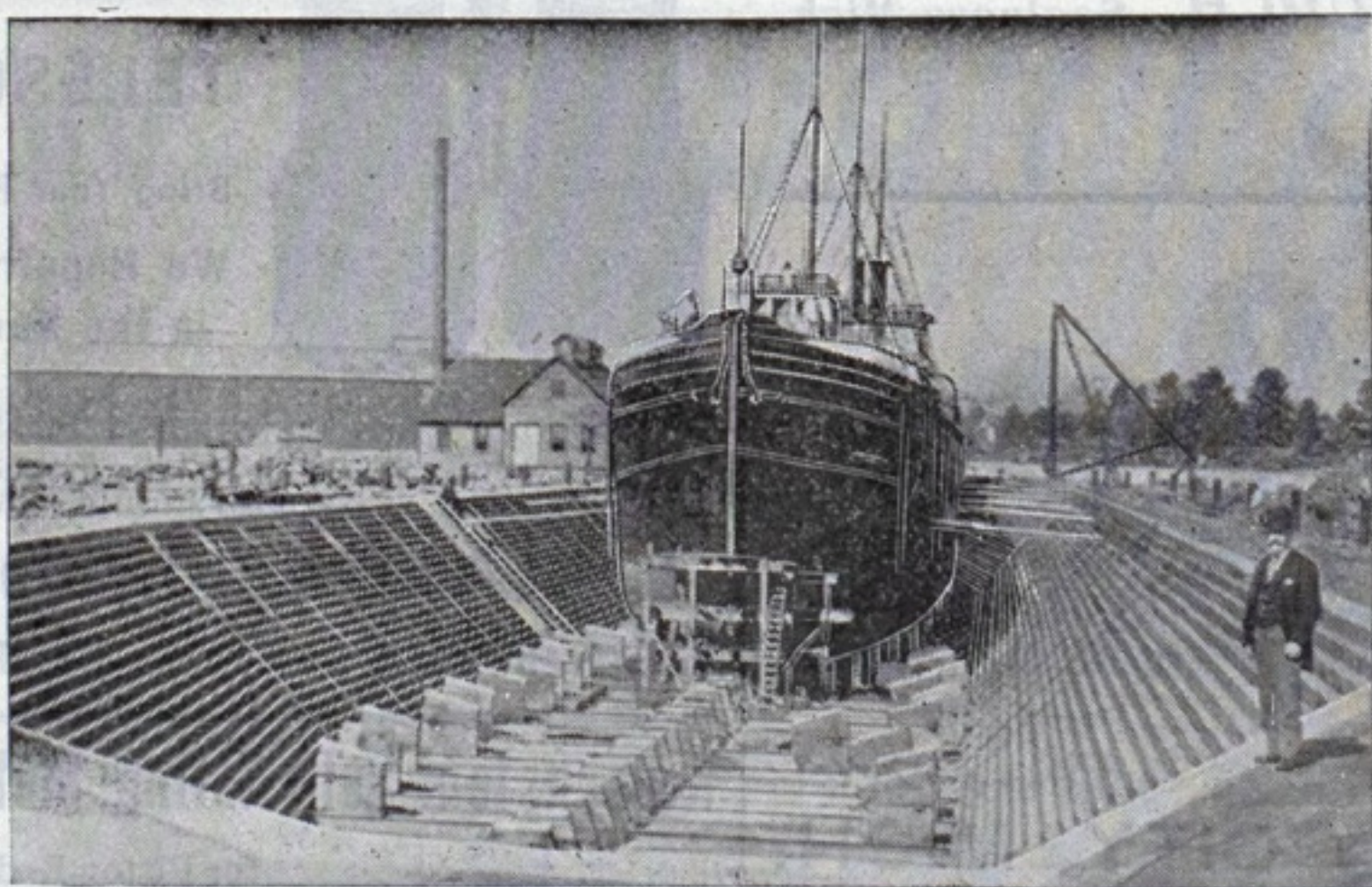
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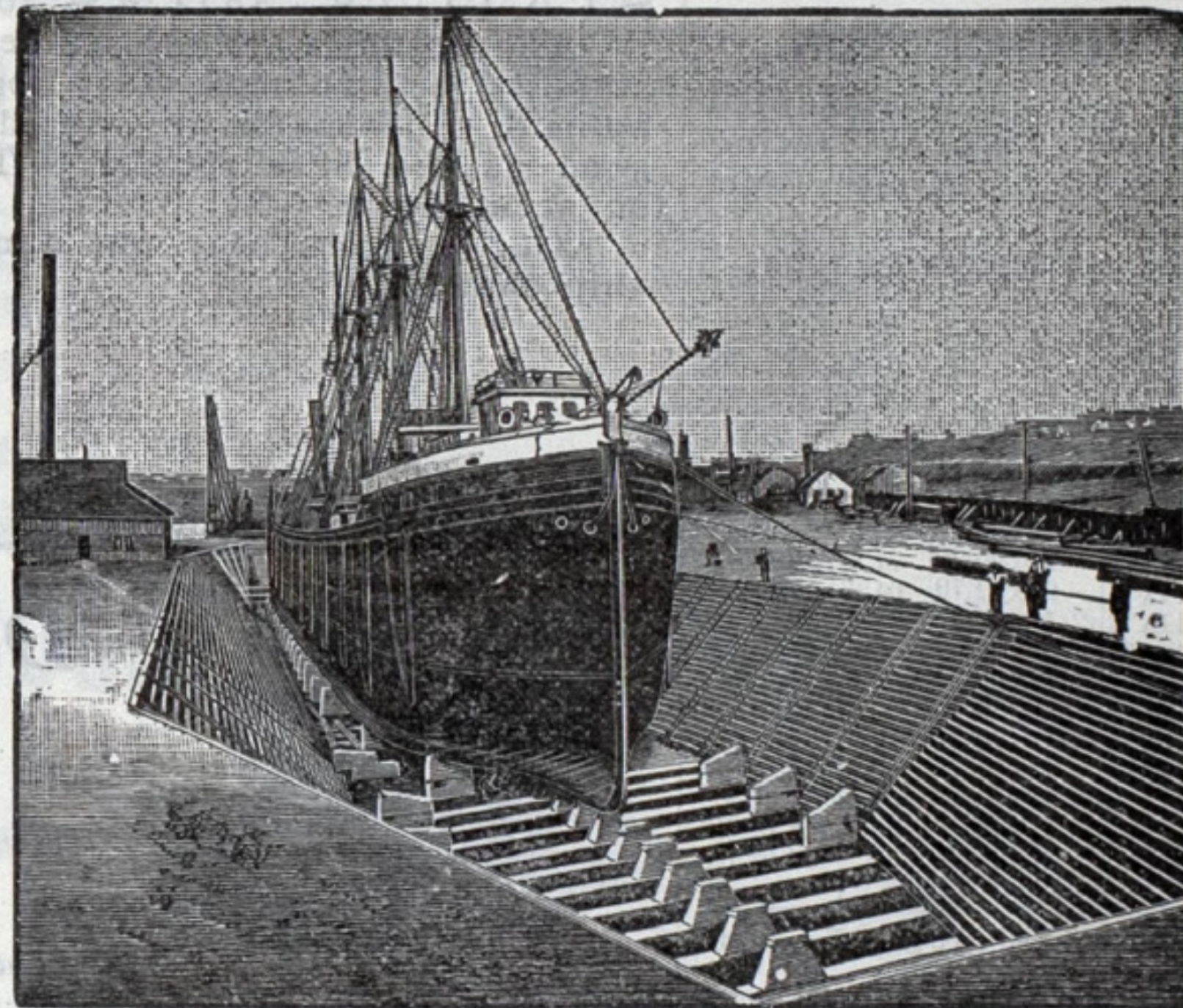
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